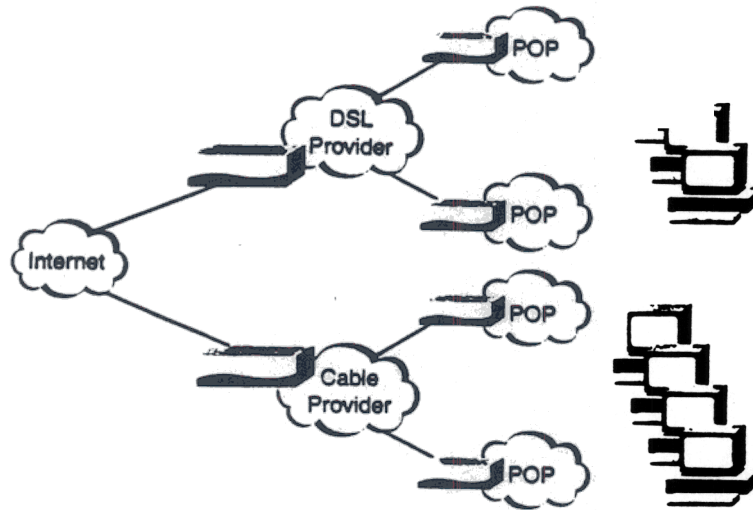


EXHIBIT H

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Service providers install CacheFlow appliances at their primary Internet access point and at the edge of their networks, in multiple PoPs (Points of Presence). A typical network configuration is displayed in Figure 2.



**Figure 2.** CacheFlow appliances deployed within the service provider's network ensure that broadband customers receive the fast Internet performance they pay for.

As subscribers request Web content from across the Internet, the CacheFlow appliance stores the most popular content locally so that subsequent requests for that content can be fulfilled without an Internet trip. CacheFlow appliances, through patent-pending algorithms in the CacheOS™ system software, can deliver as much as a 10X response time performance improvement.

### CacheFlow: Performance Plus

Along with maximizing the performance of users' broadband pipes, *which is mandatory for keeping existing customers and attracting new ones*, CacheFlow Internet caching appliances deliver many other benefits:

- **Bandwidth Gain.** Since fewer requests must traverse carrier networks, CacheFlow appliances deliver a 30-40% improvement in bandwidth utilization. This reduces one of a provider's highest expenditures, allowing prices to remain market-competitive while keeping service margins high. And as business grows, new subscribers can be serviced from existing bandwidth, delaying the need for expensive network upgrades.
- **Additional Revenue Sources.** A fast broadband network will attract popular content providers who are interested in accelerating content delivery to target subscriber bases. Revenue from the content provider to the service provider comes through QoS (Quality of Service) agreements, premium ad placement or sponsorships, and E-commerce revenue sharing.

Content filtering also provides a revenue opportunity for service providers. For example, for an extra \$5.00 per month, a "family friendly" class of service can be offered which blocks access to objectionable content such as pornography, gambling, firearms, etc. Through integration with filtering software vendors WebSense and Secure Computing, CacheFlow provides a means for controlling the content that is delivered to users' browsers.

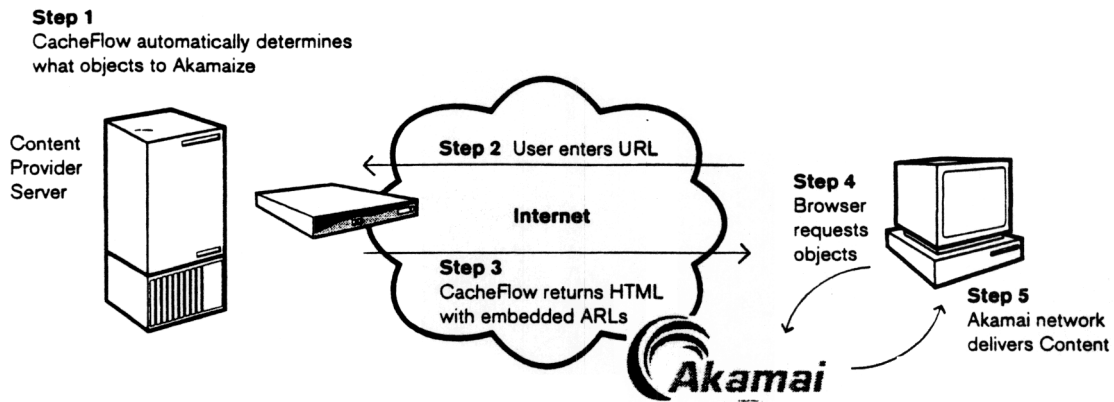


Figure 3. Automatic Akamaization

For more detailed technical information, see: *CacheFlow Technical Note: the CacheFlow Akamaizer*.

## The Advantages of CacheFlow

CacheFlow Server Accelerators are the industry's only solution specifically built to offload Web servers from content delivery tasks. Server Accelerators reduce stress on servers and enhance a site's performance and scalability by processing up to 95% of the inbound page requests.

The "on the fly" Akamaization feature is standard in all CacheFlow Server Accelerators. In addition, CacheFlow Server Accelerators include other capabilities to help Web sites optimize content flow:

- **CacheOS™ Server Edition.** This operating system is specifically tuned for the workload of a high-traffic Web site. Each parameter in CacheOS Server Edition has been modeled to deliver the best overall performance in a scenario that is significantly different than a traditional client-side caching deployment.
- **Denial of Service (DoS) resistant.** CacheFlow products use a unique mechanism to detect and withstand hacker-initiated DoS SYN floods, which have been increasingly targeted at popular Web sites. A special function that monitors the number of TCP SYN packets will notice a rise in unacknowledged sessions and immediately notify a management console that an attack is underway. The accelerator will normally provide the first warning that an attack is taking place on the site. During the attack, the Server Accelerator will continue to connect and serve legitimate users.
- **CacheFlow Content Manager.** This tool ensures that content is synchronized in real-time across a network of Server Accelerators. As updates to content occur, CacheFlow Content Manager ensures that the "new" content is propagated to all Server Accelerator devices for rapid delivery.
- **SSL optimization.** Processing SSL (Secure Sockets Layer) session negotiation and management is a significant drag on server CPU resources. The CacheFlow Server Accelerator alleviates this burden by handling secure encryption and decryption in optimized hardware and software. The accelerator can process 10-40 times more SSL sessions than a general-purpose server.
- **High reliability and availability.** Designed for robust network requirements, CacheFlow Server Accelerators are extremely reliable. In the case of a device fault, they perform a "fast restart" within seconds, with no human intervention. No perceived loss of service is experienced, and administrators are alerted to the restart via automatic notification from the device.
- **Simple management.** All CacheFlow products are designed to be installed in minutes and require practically no administration. They are self-tuning and self-healing devices. Other solutions require regular maintenance and scheduled downtime. CacheFlow devices provide the simplicity and ease of use of a true appliance.

If a simple cache is deployed and is significantly improving Web page response time, it will deliver stale data to end users. Faster access to stale data is not a QoS improvement.

Accelerating the Internet requires very fast access to Web server content that exists at the moment the request is made, not content that existed minutes or hours ago and has since changed. Passive caches by definition cannot deliver this capability.

### III. CacheOS: Fast Delivery of Fresh Content

CacheOS, the patent-pending operating system embedded within CacheFlow's family of Internet caching appliances, is the industry's only proven solution for delivering content to end users quickly and accurately.

Speed. CacheFlow products are renowned for delivering Web pages extraordinarily faster than competitive alternatives.

Accuracy. Only CacheFlow products measure and report the actual freshness of content delivered to end users.

CacheFlow improves Internet QoS through a technical focus on algorithms designed to attack the latency of the Internet. With CacheFlow, network administrators can be confident that their end users are receiving the fastest response time for the same content that exists on the Internet at the moment the users request it.

#### A. Object Pipelining: Fast Content Retrieval, The First Time

When a browser requests content, dozens of round trips must take place between the browser and the distant Web server. This is because a Web page is typically composed of dozens of objects, and for each object there typically must first be a TCP session setup followed by an HTTP "get" request (Figure 1).

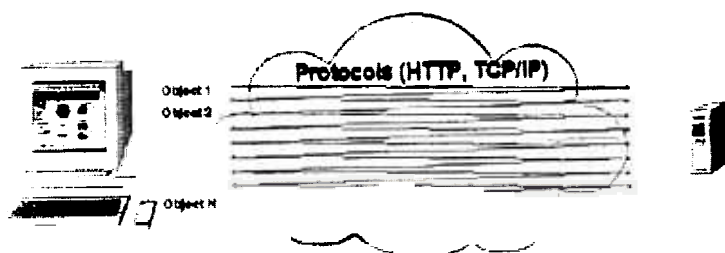


Figure 1: How Browsers Retrieve Web Pages

This serial retrieval of objects presents a major delay for the end user.

With CacheFlow deployed, a large portion of this delay is eliminated. The client connection terminates at the CacheFlow device, which leverages the latency-attacking algorithms in CacheOS. One of these algorithms is called *Object Pipelining*. Instead of retrieving objects serially, this patent-pending algorithm opens as many simultaneous TCP connections as the origin server will allow and retrieves objects in parallel. The objects are then delivered from the appliance straight to the user's desktop as fast as the browser can request them.

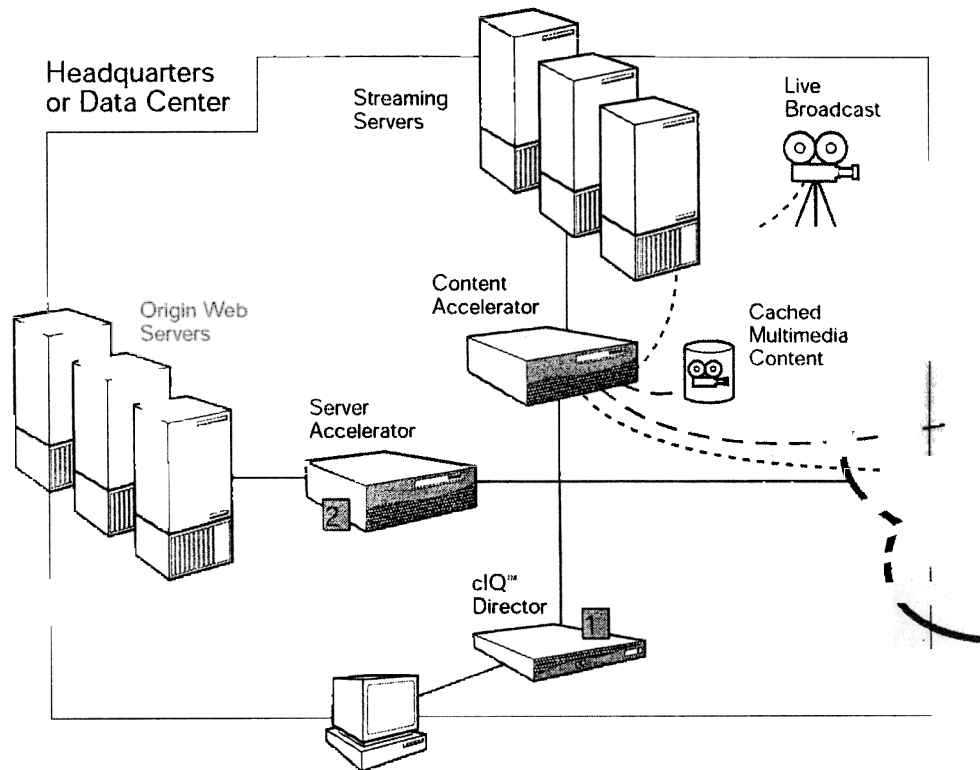
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NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA

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# clQ: intelligent technology for

>>> CacheFlow's clQ content delivery architecture-the industry's first comprehensive architecture for building content-smart delivery solutions optimized for enterprises and service providers.



**1** clQ Director is an open management platform that consists of integrated hardware and software in an easy-to-use, appliance form factor. clQ Director is designed specifically to manage, distribute and synchronize all types of static, dynamic, secure and multimedia content from the data center to the network edge.

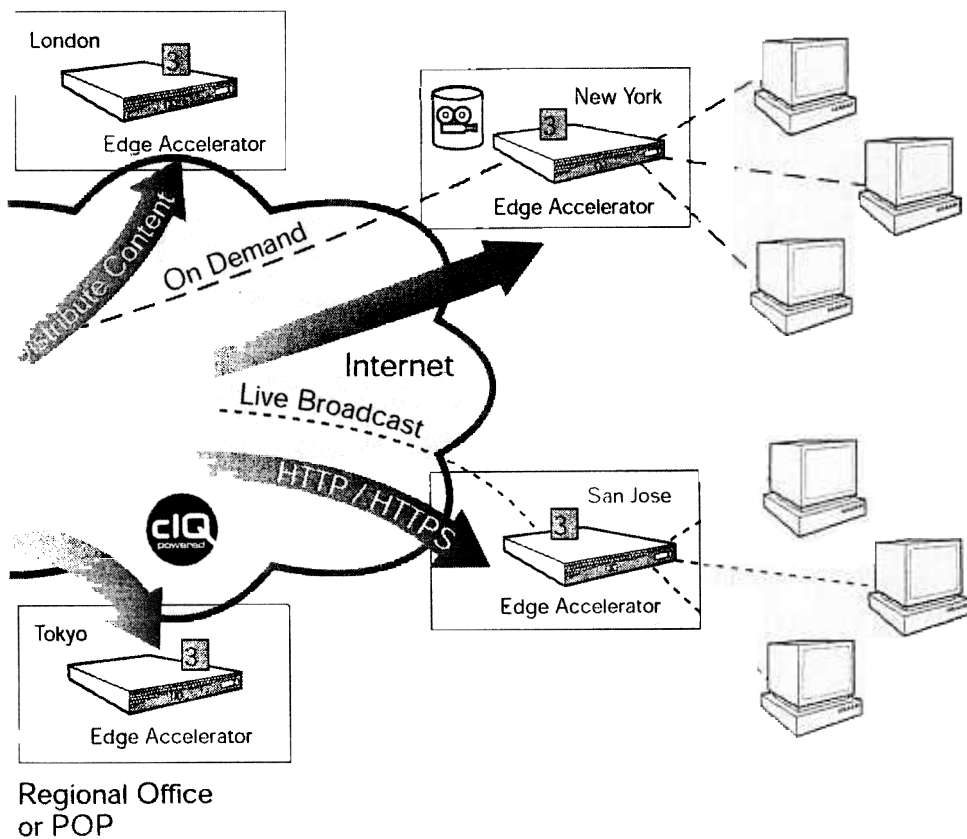
**2** clQ Server Accelerators accelerate and scale web farms by serving up to 95% of http and https content without taxing back end servers. Server Accelerators deliver static, dynamic, personalized and private content to end users, improving response times by 50-80%.

**3** CacheFlow accelerators deployed at the network edge scale network resources and accelerate web and multimedia content to remote offices and partners. The devices intelligently communicate to origin servers and clQ Director to refresh content.

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Protective Order  
NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA**

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# building content-smart networks



## cIQ Streaming Services

Optimize networks for live and on-demand streaming content and increase viewing and listening quality with streaming multimedia solutions from RealNetworks', Microsoft' and Apple'.

## cIQ Filtering Services

Enable organizations to administer, manage and log user-based access policies to content. Allow administrators to easily block objectionable content to minimize potential legal, productivity or resource utilization issues.

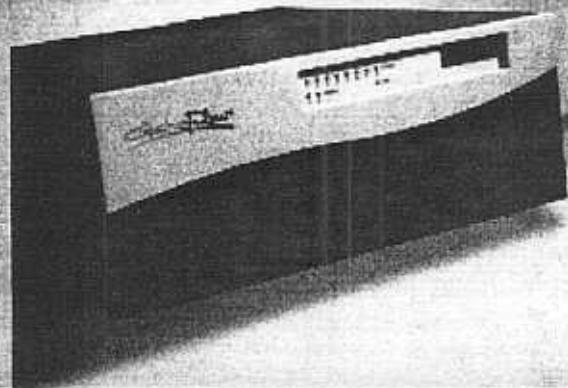
## cIQ Security Services

Provide encryption and acceleration of secure content to remote and corporate users, and protect sites from hacker-initiated Denial of Service attacks.

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NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA**

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CacheFlow  
Making the Internet Content Smart



## 7000 Series

Content Intelligent Networking Products  
for Content Providers

### The SA-7000 delivers:

- > Faster response times for Web site users (50 to 80%)
- > Higher site scalability (up to 10 times) to handle ever-increasing traffic volumes
- > Up to 90% lower space and power requirements
- > Significant capital and operational cost savings
- > Dramatically improved customer satisfaction and loyalty

### Set Your Sites on Accelerated Performance

Under the pressure of rising traffic volumes, richer content types and increasing user expectations, server-dependent Web site infrastructures experience more strain than ever.

The CacheFlow Server Accelerator 7000 Series, an integral component of the CacheFlow cIQ™ Content Delivery Architecture, consists of high performance Internet appliances that offload Web servers from content delivery tasks. The SA-7000 reduces stress on servers and enhances a site's performance and scalability by processing up to 95% of inbound page requests.

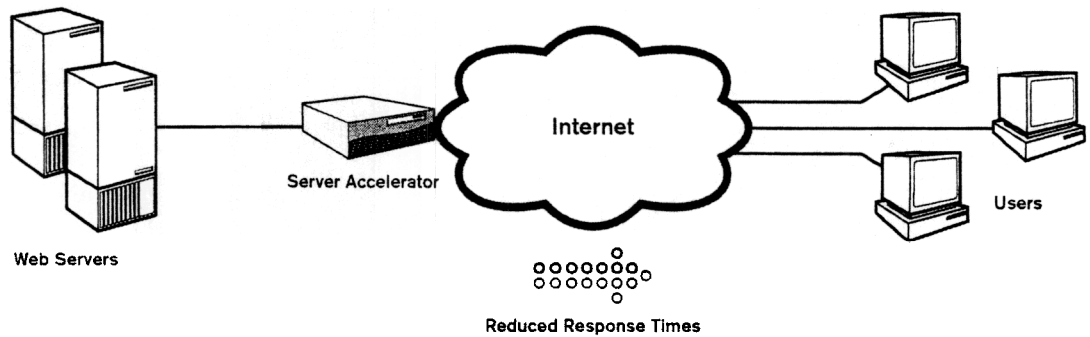
The Server Accelerator 7000 Series is the industry's most powerful and scalable way to accelerate Web farms.

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NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA**

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# 7000 Series



**The SA-7000 services up to 95% of a site's inbound requests, delivering content directly to users and offloading Web servers. The server accelerator will deliver both public (HTTP) and private (HTTPS) content, whether that content is static or dynamic in nature.**

## Overview

### Industry Unique Solution

The Server Accelerator 7000 Series is specifically designed to improve the performance, scalability, security and manageability of high-traffic Web sites. Deployed in minutes "in front of" any Web server, the SA-7000 dramatically accelerates the delivery of Web content to users and typically serves five to ten times the content of a single Web server.

### Building on the Industry's First Web Server Accelerator

The SA-7000 Series is expressly tuned for the workload of a high-traffic Web site. This environment is characterized by a finite amount of site content and access by millions of users from around the world – characteristics that are the exact opposite of traditional caching scenarios. To accommodate this unique application, the SA-7000's hardware architecture and CacheOS™ Server Edition software are optimized to handle heavy transaction loads. Additionally, the SA-7000 products offer integrated Secure Sockets Layer (SSL) capabilities to offload CPU intensive HTTPS sessions – enabling the management of 40 times the secure sessions of a standard Web server. The SA-7000 also includes advanced features like an intelligent "Akamaiizer," which automatically prepares content for the Akamai FreeFlow<sup>SM</sup> network, and protection against malicious Denial-of-Service attacks, designed to crash Web sites.

As a true Internet appliance, the SA-7000 Series installs in minutes and requires little ongoing maintenance. Administrators have the flexibility of interfacing with the SA-7000 through a browser-based GUI or through a secure command-line utility.

## Customers and Applications

The SA-7000 Series is designed for business-critical Web sites that need to accelerate performance and scale traffic levels, without expensive server build-outs. Organizations and applications that can benefit from the SA-7000 include:

### E-commerce, E-business, Content and Portal sites

- > Deliver a high quality experience to visitors
- > Generate more revenue and increase customer loyalty

### Enterprises

- > Accelerate Intranet/Extranet content to employees, partners and customers
- > Increase organizational productivity and streamline the supply chain

### Web Hosting Providers

- > Deploy server accelerators within a hosted customer's infrastructure
- > Grow revenues through a high-value service offering

In addition to its robust core functionality, the SA-7000 integrates with leading solutions from CacheFlow ACE partners to optimize content

publishing, request load balancing, content distribution and site reporting. This integration allows sites to build world-class Content Intelligent Networks.

## Platform and Software Features

The SA-7000 Series is the industry's premier solution for accelerating and scaling business-critical Web sites. The SA-7000 is designed to seamlessly integrate with a site's existing systems and networks, delivering an immediate performance impact. The following capabilities of the SA-7000 help high-traffic Web sites to serve more customers through a lower-cost infrastructure.

### Key Platform Features

#### Optimized Configuration for Web Server Acceleration

- > High RAM-to-disk ratio
- > Specialized system architecture

#### Industry-Leading Content Delivery Horsepower

- > Dual 800MHz CPUs
- > Generates 400 Mbps of data throughput

#### SSL Cryptographic Processors

- > Supports up to (4) Processors
- > Processes up to 800 key negotiations per second, ~40 times the power of a standard Web server

#### Data Center-Class High Availability

- > Hot-swappable disk drives
- > Redundant hot-swappable power supplies

#### Space Friendly 4U (7.0") Form Factor

- > Delivers real estate cost savings

#### Optimized Power Utilization

- > Only outputs 300 Watts

#### Simple to Manage Appliance

- > Installs in minutes; little ongoing maintenance required

### Key Software Features

#### CacheOS™ Server Edition

- > Industry's only system software that is tuned for the workload of a high-traffic Web site

#### clQ™ Director Compatibility

- > Intelligent synchronization and management of content across a distributed network of server accelerators

#### CacheFlow Intelligent Akamaiizer

- > Automatically readies content for the Akamai FreeFlow service
- > Combined CacheFlow/Akamai solution allows sites to scale globally and gracefully handle peak events

#### Secure Content Acceleration

- > Can accelerate both public (HTTP) and (HTTPS) content through integrated SSL functionality
- > Can establish an SSL session back to the origin Web server, enabling secure communication across a distributed network

#### Dynamic Content Acceleration

- > Accelerates *all* content that is not unique to a user, including dynamically generated pages
- > Accelerates all images within user-specific pages

#### Denial of Service (DoS) Protection

- > Prevents sites from crashing during hacker-initiated DoS attacks
- > Server accelerator distinguishes between valid and malicious connections, servicing users while resisting the attack

#### Robust Security

- > Certified by a leading security audit firm for safe placement outside the firewall

**CONFIDENTIAL-Subject to  
Protective Order  
NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA**

## 7000 Series

## Configuration &amp; Specification Chart

	Model SA-7225	Model SA-7285
<b>System</b>		
Disk drives	2 x 18 GB Ultra2 SCSI	8 x 18 GB Ultra2 SCSI
	4 GB	
	(1) integrated; supports up to (3) additional 10/100/1000 Base-T, 1000 Base-SX, 1000 Base-LX interfaces	(1) integrated; supports up to (3) additional 10/100/1000 Base-T, 1000 Base-SX, 1000 Base-LX interfaces
SSL Cryptographic Processor	Up to (4); 800 key negotiations/sec	Up to (4); 800 key negotiations/sec
	400 Mbps	400 Mbps
	Up to 4 GB	
	CacheOS <sup>™</sup> Server Edition	
	SSL v2.0 and v3.0, TTL insertion, DoS Protection, Event Logging, Cookie Logging, SSh, Performance Monitoring and Reporting, SNMP, Advanced Routing and Load Balancing, Clustering, Automatic Fast Restart, Log File Formats (Common, Squid, Custom), HTTP 1.0 and 1.1, WCCP v1 and v2, Caching Authenticated Content, Packet Capture	
<b>Enclosure</b>		
19" Rack-mountable	Yes	Yes
<b>Power</b>	AC power 100-240V, 47-63Hz; 300 Watts; Up to 2 power supplies	AC power 100-240V, 47-63Hz; 300 Watts; Up to 2 power supplies
<b>Operating Environment</b>		
Temperature	5°C to 50°C (41°F to 122°F)	5°C to 50°C (41°F to 122°F)
Humidity	Less than 90% relative humidity, non-condensing	Less than 90% relative humidity, non-condensing
	Up to 2438 M (8000 ft)	Up to 2438 M (8000 ft)
<b>Dimensions and Weight</b>		
Height	177.8 mm (7.0 in); 4 rack units	177.8 mm (7.0 in); 4 rack units
Width	442 mm (17.4 in)	
	603.25 mm (23.75 in)	
	24.63 kg (54.3 lb)	
	FCC Class A, EN 55022 Class A	
	CSA C22.2 No. 950 M95, UL 1950 3 Edition, IEC EN60950	
	Standard warranty: 1-year hardware and 90-day software and technical phone support, including 90-day CacheSupport 24x7; extended and upgraded support plans available	

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Protective Order  
NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA**

Server accelerators are sized according to the amount of throughput required and the working set size. The working set is defined as the amount of unique content served over the course of a day. A server accelerator will deliver maximum performance when working set content is served directly from RAM.



### Multicasting

CacheFlow appliances support IP multicasting. This allows the appliance to take a unicast stream, and redistribute it as a multicast stream. By multicasting, the CacheFlow appliance uses fewer downstream connections and in turn, less bandwidth. This further reinforces the benefits of stream splitting.

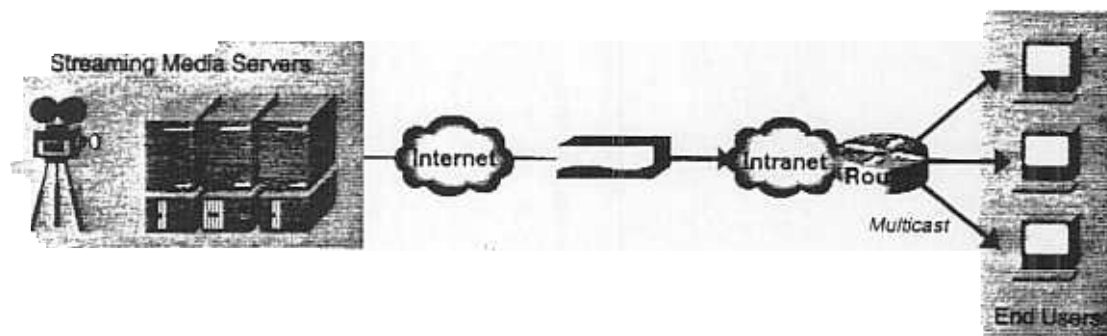
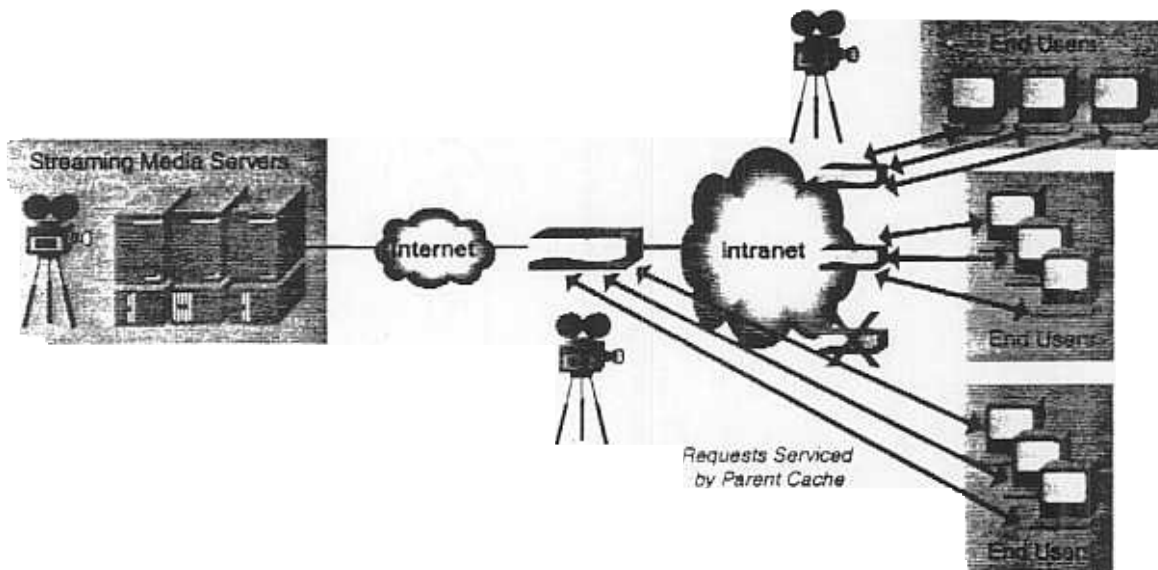


Figure 4. Multicasting

### Cache Hierarchy

CacheFlow Internet Caching Appliances can be deployed hierarchically. This allows stream splitting and/or streaming media file caching to occur at the point in the network where it makes the most sense. It also offers a failover mechanism that allows a parent cache to assume the responsibilities of a child cache should the child cache fail.



**CONFIDENTIAL**-Subject to  
Protective Order NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA



### Proxy Server Management

CacheFlow appliances are based on lightweight CacheOS, not a general-purpose operating system as with proxy servers. CacheOS can be up and running after only 4 parameters are entered. The appliance is self-tuning and self-healing. If it reaches an unrecoverable state, it performs a fast restart in less than 10 seconds. Each disk in the appliance contains a copy of CacheOS, so that up to N-1 disk failures can occur without crippling the device. This is in stark contrast to most proxy servers that use a RAID-based protection scheme and require a complete system rebuild should only 2 disks fail.

The effortless management of a CacheFlow appliance is beneficial to any IT organization. However, it is especially important when the appliance will be deployed at a remote site.

*"Not only does the CacheFlow solution deliver the performance gains and bandwidth efficiencies we need, it's also easy to implement and centrally manage. This is of terrific benefit because our IT department needed to be able to send the appliances to other sites and walk other employees through the installation by phone. The CacheFlow solution is simple to install, and you don't have to baby-sit it."*

Internet Systems Engineer,  
Fortune 500 company

### Client-Side Administration

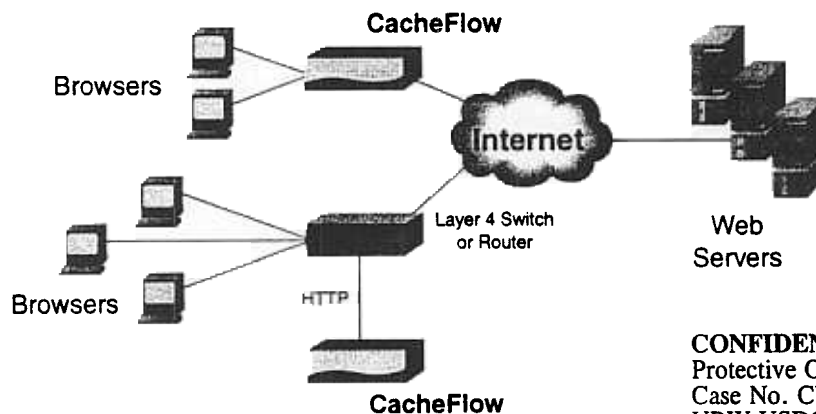
A CacheFlow appliance is flexible in its configuration. It can be configured in either transparent mode or proxy mode.

This flexibility allows caching to be deployed throughout a network, for all users of Web applications.

Transparent mode eliminates the need to explicitly identify the cache to the browser. Web users automatically receive the performance benefits, without any client-side configuration. Transparency is enabled through a Layer 4 switch or WCCP-enabled router, whereby all HTTP requests are redirected to the cache. The switch or router monitors the health of the appliance, and ceases to redirect HTTP traffic should a device become unavailable. Even if the cache goes offline, user service isn't interrupted.

Proxy mode (not to be confused with a proxy server) requires that each browser specify the cache as its Internet dispatcher. This approach is appropriate when: 1) the CacheFlow appliance is replacing an existing proxy server and the browsers are already configured, or 2) there are budget or equipment constraints which prevent the use of transparent caching.

Figure 3 illustrates the flexibility of a CacheFlow configuration.



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Protective Order NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA

**Figure 3. Flexibility of CacheFlow.** The appliance can be configured in either Proxy or Transparent mode. In Proxy mode, browsers connect directly to the CacheFlow. In Transparent mode, all traffic flows through a Layer 4 switch or WCCP-enabled router, with HTTP being redirected to the appliance.

## Enterprises

Streaming media saves time and money in many ways, but additional bandwidth is costly. IT managers are constantly seeking solutions for squeezing more out of their Internet and intranet activities without exceeding their budget. Full-screen video and CD-quality audio made possible by streaming create extraordinary possibilities for business use, but at what cost?

CacheFlow's content-smart technology deployed on a corporate network (Figure 2) provides the enterprise with the performance, reliability and control needed for an effective streaming media deployment.

1. **Live Broadcasts** – CacheFlow content accelerators deliver one stream to multiple users, reducing the amount of bandwidth consumed by a live presentation.
2. **On-demand Video** – CacheFlow's enterprise content management ensures that content is close to users by pre-populating content accelerators to provide optimal performance.
3. **Filtering** – CacheFlow's content-smart appliances can filter user requests, minimizing network congestion by eliminating inappropriate content.

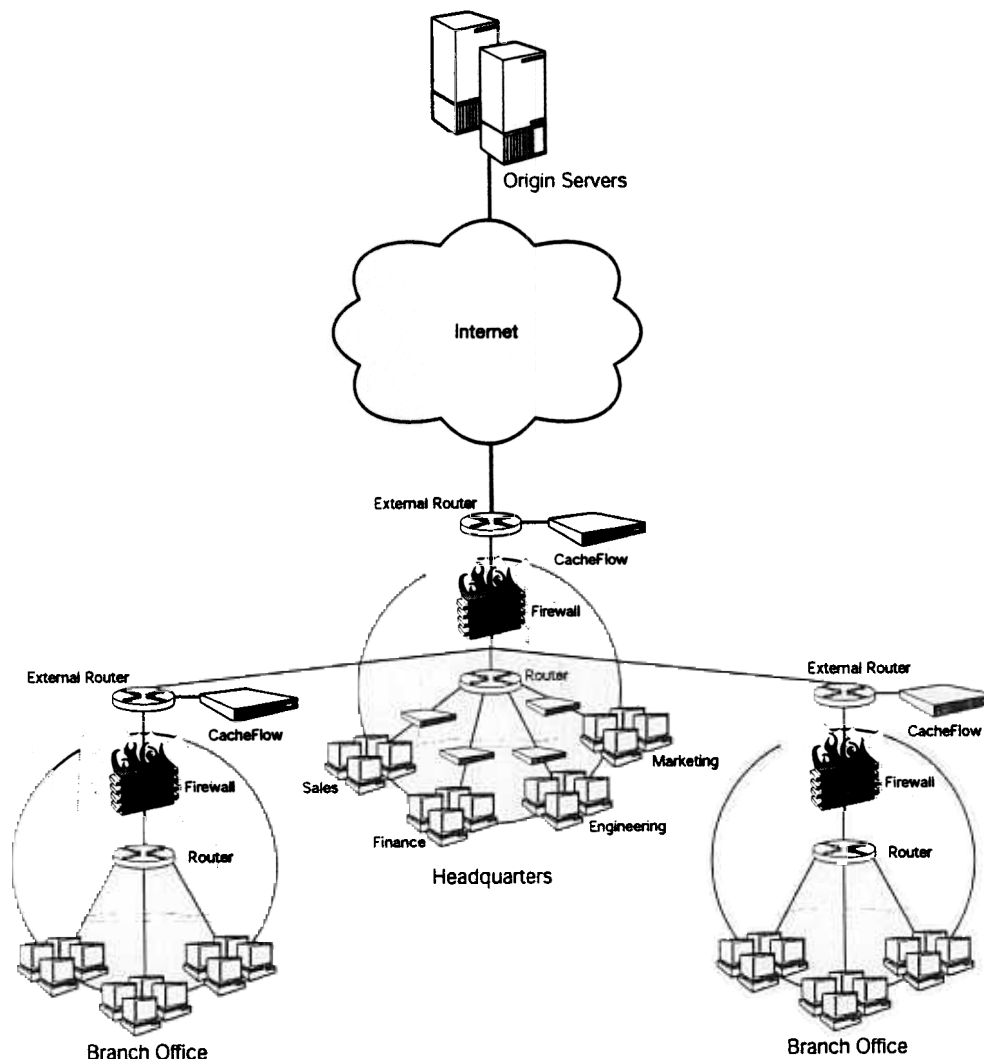


Figure 2. Enterprise Deployment

## Content Providers

As content providers seek to take the web experience to a new level of engagement, network uptime, speed, and performance are paramount. Streaming media is performance sensitive, and Internet congestion is a constant challenge.

By deploying CacheFlow content accelerators on the Internet (Figure 3), content providers can realize the performance and reliability needed to provide a positive end-user experience.

- Improved Performance -- CacheFlow content accelerators shorten delivery paths and navigate around Internet congestion.
- Instant Scalability -- CacheFlow content accelerators reduce the impact of traffic spikes from high-interest events, such as popular sporting events, by providing a cost-effective, simple solution to increasing capacity.

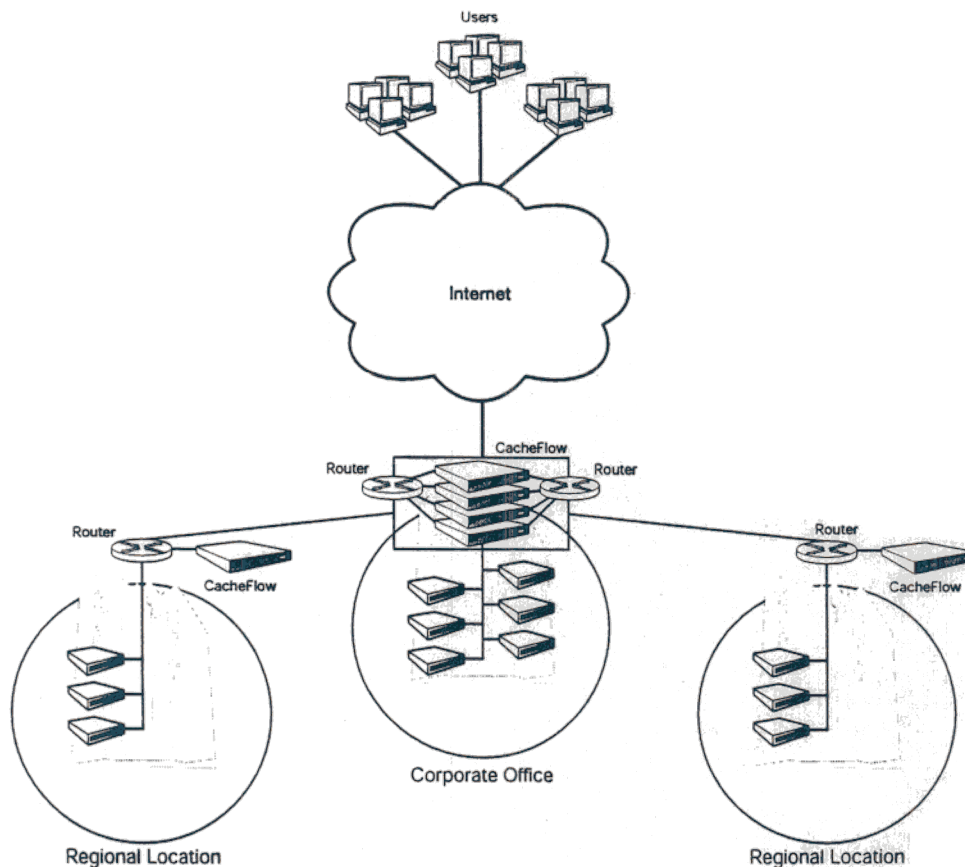


Figure 3. Content Provider Deployment

**CONFIDENTIAL**-Subject to  
Protective Order NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA

# Caching Overview

A cache greatly improves web performance by storing content locally and re-presenting the content when a browser requests it. As a result, a browser does not need to communicate with the web server repeatedly. Content can be served from a strategically located cache much more quickly than from a web server.

Caching of web content normally occurs at one or more of the following places:

- > At the client (browser)
- > Behind a company's firewall
- > At the web site

**CONFIDENTIAL**-Subject to  
Protective Order NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA

The following sections examine each type of caching.

## Client-Side Caching

Most browsers available today support client-side caching by default. When an Internet user initially accesses a site, the browser caches web objects on the user's local hard drive. During subsequent visits to the web site the client browser can reuse locally cached objects, and only needs to request new or changed objects from the web site. As a result, the browser can display web pages more quickly during subsequent visits to the site since the web site has less data to transmit to the web browser.

Client-side caching is a good solution for home users and small organizations, but it has drawbacks that limit its usefulness in large environments. These drawbacks include:

- > IT departments may need to configure each user's browser differently.
- > Browsers across a large company may be caching the same content for different users. This is highly inefficient and is a poor use of resources.
- > Client-side caching wastes bandwidth since each user that loads a web site may be using bandwidth to load the same images and content as their neighbor.

In large environments where users are accessing the same content repeatedly, shared caches are a more effective solution than client-side caches.

## Forward Proxies

A forward proxy, such as CacheFlow's Edge Accelerator, is a shared cache that organizations install behind their firewall. A forward proxy will cache frequently accessed content and deliver the content to web browsers upon request. When a browser accesses a web page, it queries the forward proxy to see if it has already cached the content. If the content is not already in the forward proxy's cache, the proxy retrieves the content from the web site and delivers it to the web browser. The proxy then stores the content for future use. The next time a user attempts to load the same web pages, the proxy will deliver the content from cache. This means that users will receive the content much faster since the content is being delivered locally and not across the Internet.

## Reverse Proxies

A reverse proxy or server accelerator, such as a CacheFlow Server Accelerator, is a shared cache that web content providers install close to web servers to accelerate delivery of content to the Internet users. Server Accelerators serve up content that the web server would otherwise be required to regenerate repeatedly; delivering greater performance than the web server could provide alone.

Generally, a web server will generate an HTML response to a browser request. The response may be static HTML, a script (such as JavaScript), or dynamically generated tables culled from a database. By placing a server accelerator in front of the web servers or web site, the accelerator will serve the content for the web servers. As a result, the web servers can handle a larger load since the server accelerator has removed the burden of content delivery and the majority of TCP handshaking.

# What Content Should I Cache?

One of the biggest challenges caching presents is determining what content to cache and how long to cache it. Because of this, many content providers would prefer not to cache any content at all. However, not caching at all is not a realistic solution for today's Internet.

A common misconception in the caching space is that you cannot (or should not) cache dynamic content. This idea stems from the notion that dynamically generated content is 100% dynamic. However, in most cases dynamic content contains some static data. For example, icons, bitmaps, and text headers are usually static. These items are cacheable, and by caching them with a server accelerator, you can enhance the performance of even the most dynamic web servers.

Other caching considerations include:

- > What types of data should you cache?
- > How long should you cache an object?
- > How much content should you cache?
- > How long can content be in cache before being considered stale?
- > Can server-side script-generated content benefit from caching?

The remainder of this paper addresses these questions.

## Types of Cacheable Content

The more content that you cache using a server accelerator the more you will improve your web site's performance. To help you determine what content to cache, CacheFlow has broken down cacheable content into the following three categories:

**Type T content** – Content that includes an HTTP header that specifically designates an expiration time. With Type T content, a server accelerator can determine if the content is fresh by simply comparing the expiration date of the page to the current date.

**Type M content** – Content that includes a Last Modified tag. With Type M content, a server accelerator uses the Last Modified tag to determine the freshness of the page. If the page has changed, then the server accelerator will cache a new copy of the page.

**Type N content** – Content that has no caching information specified. Type N content is the most difficult type of content to cache because it does not explicitly state or infer content type or freshness. It is also difficult to determine if the content provider did not specify caching information because they do not want the content cached, or if it was an oversight.

### Caching Content with Cookies

One type of content that would seem to be non-cacheable is a response generated based on a user cookie. User cookies are, by their very nature, user (and browser) centric. Web content creators use cookies in a number of situations to guarantee a unique user experience on a web site.

How a content creator uses a cookie governs whether or not the response is cacheable. If the content creator uses a cookie to customize a specific user's experience, then the response is generally not cacheable. If the content creator uses the cookie to determine when the user last logged in or to update content such as a news story that is generic to all cookies users, then the response is generally cacheable.

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Protective Order NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA

### **Cookies that Create a Custom User Experience**

When a content creator uses a cookie to create a custom user experience, the cookie customizes the content for an individual user. For example, a cookie can customize a user's personal bank statement. When a content creator uses a cookie in this fashion, the user specific content may not be cacheable but many other elements of the page are cacheable. In our bank statement example, even though the ending balance data is not cacheable because it is only valid for a short time, data such as the bank logo, the headers, and generic HTML text (such as ENDING BALANCE), are static. This static data is cacheable.

To cache this type of content, the web server administrator must configure the HTML items and web servers in such a way that downstream proxies know whether to cache the content.

### **Cookies that Determine Time-Based Information**

When a content creator uses a cookie to determine time-based information, web server processes (such as ASP scripts, CGI, or JavaServlets) can use the cookie to determine how much time has passed since the user last visited the web site. Based on this information, the web server can determine whether it should deliver timely information to the user.

For example, assume that every user that visits a particular web site receives a top news story as soon as they hit the site. Now let us assume that the top story changes every minute. When a user accesses the site, the web server uses the cookie to determine whether it should deliver an updated version of the new story to the user. Each time the web server delivers the news story it must re-generate the content.

By placing a server accelerator in front of the web server or web servers, the server accelerator will deliver the updated news story to the users. The first user that visits the site will cause the web server to generate the news story content. The server accelerator will then cache the news story based on web server and server accelerator settings and deliver the cached version to subsequent users. Now let us assume that the cached version has an expiration time of 60 seconds, indicating to the server accelerator that it should re-refresh the content 61 seconds later. If 1000 users access the site in the 60-second period, the web server will only generate the content once and deliver it to the server accelerator. The server accelerator will then deliver the content to all 1000 users. This significantly reduces the web server's load and increases the overall web site performance.

## **Caching and the HTTP Protocol**

The architects of the HTTP protocol provided provisions for determining the cacheability of content in the HTTP header. Regardless of the version of HTTP your web server uses (version 1.0 or 1.1), the HTTP header can specify, as a minimum, how long the data will be fresh. Based on the HTTP header, a proxy or a browser can determine whether to cache the content or not. If it does cache the content, it can use the HTTP header to decide how long it should consider the content fresh. HTTP 1.0 and HTTP 1.1 have slightly different mechanisms for indicating content freshness.

### **HTTP 1.0**

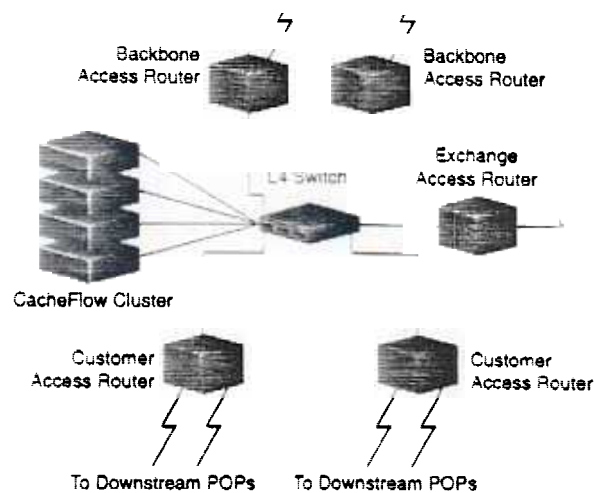
HTTP 1.0 provides two pieces of information that inform a proxy or a browser of the cacheability of the content:

- > **Pragma: no-cache** – This tag informs any downstream component (proxy or browser) that it should not cache the content in any way. This tag turns off caching of any kind for the content that the proxy or browser is about to receive.
- > **Expiration tag or TTL (Time-To-Live) tag** – This tag indicates that a downstream proxy or browser can cache the content. The tag also specifies how long the content will remain fresh. This minimal information requires the proxy or browser to perform data computations to determine if the freshness time has passed and the content is stale.

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Case No. CV-01-2079  
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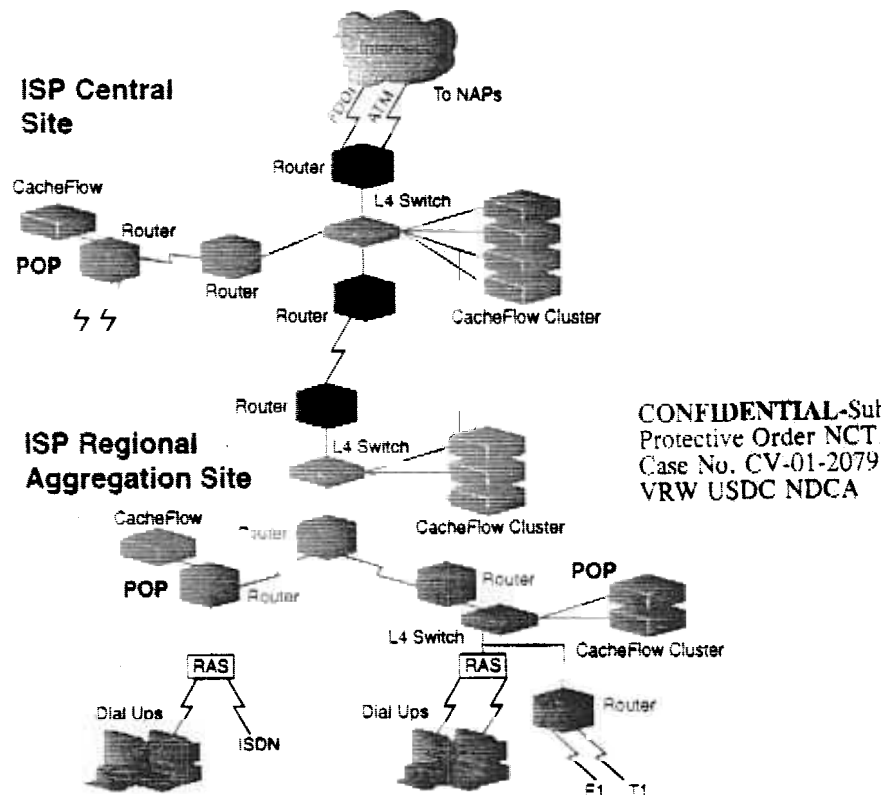


## ISP Caching Deployment Guide



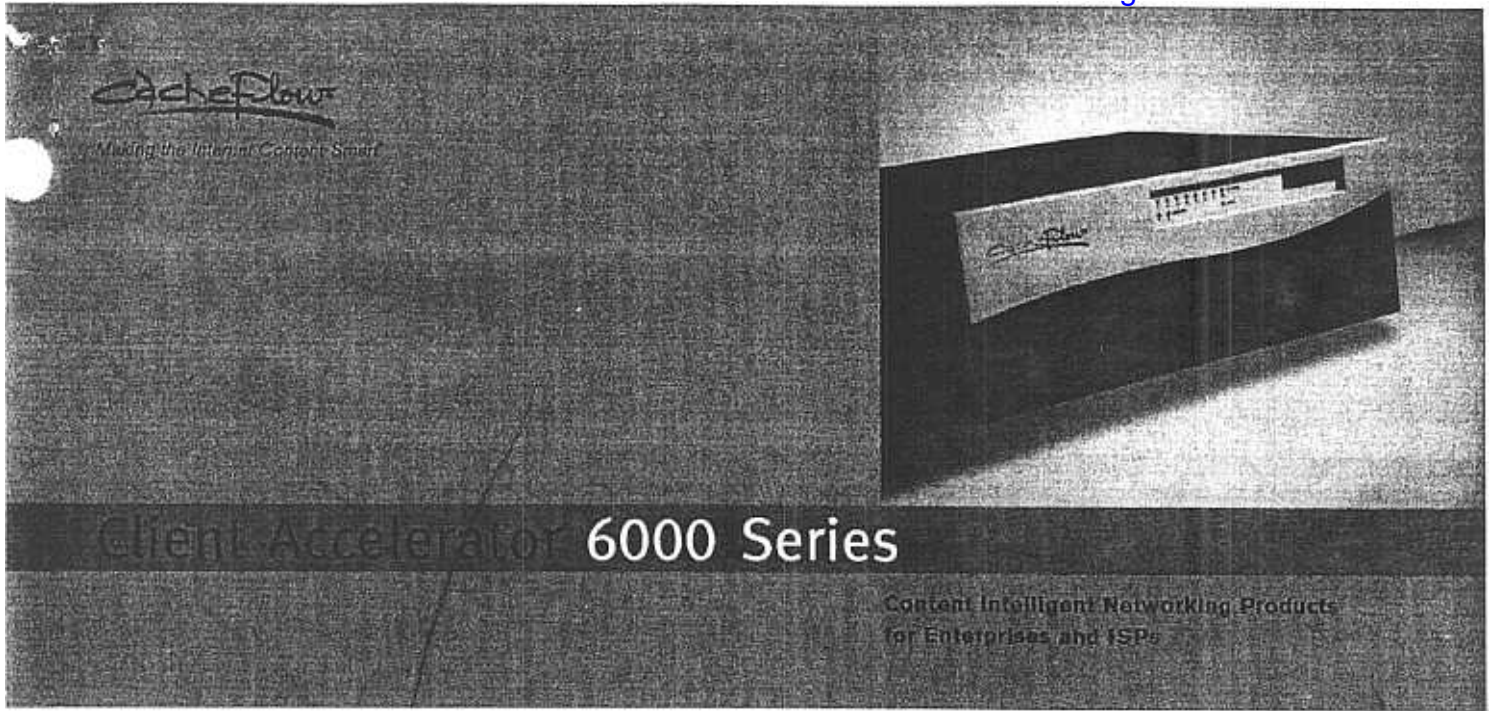
**Figure 2. CacheFlow Deployment at an Aggregation Site**

Over time, caches will be deployed across the network. Figure 3 shows a hierarchical deployment of CacheFlow products, beginning with the POPs closest to users and working upstream through aggregation sites to the provider's central site.



**Figure 3. CacheFlow Deployment Across a Provider's Network Infrastructure**





The CA-6000 Series delivers:

- > Up to 10 times improvement in Internet and intranet response times
- > Scalability of existing network infrastructure to support growing content requirements
- > Up to 60% reduction in WAN bandwidth utilization
- > Optimized delivery of on-demand and live streaming media content
- > Advanced content filtering to restrict access to inappropriate Web sites

#### Maximize Return on Network Assets

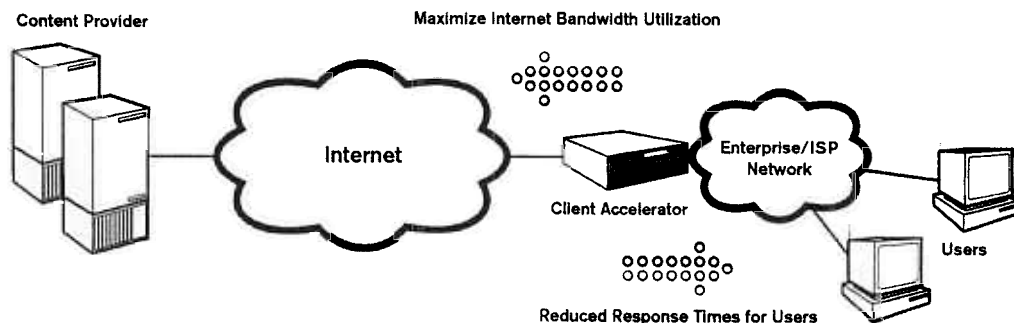
Today's demands for Web and streaming media content can cause costly bandwidth upgrades, server bottlenecks, and lower productivity. CacheFlow provides Content Intelligent Networking solutions that transform your network to manage these issues without requiring complete changes to the existing infrastructure.

The CacheFlow Client Accelerator 6000 Series consists of high performance Internet appliances that enhance the end-user experience and scale existing network infrastructure by intelligently moving content closer to users.

The Client Accelerator 6000 Series is the industry's premier platform to optimize WAN resources, improve employee productivity and manage mission-critical content.

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## 6000 Series



CacheFlow Client Accelerators store Web and multimedia content locally and typically deliver on 60% or more of all user requests. The result is an extremely fast Internet experience for users and more efficient bandwidth utilization for Enterprises and ISPs.

### Overview

#### Proven Solution

CacheFlow Client Accelerators are high-performance content delivery solutions for enterprises, ISPs, educational institutions and government agencies. Client accelerators enable organizations to effectively manage, distribute and accelerate content with unmatched speed and efficiency.

#### Intelligent Delivery of Web and Multimedia Content

The CacheFlow Client Accelerator is deployed between users and the Internet, and intelligently manages requests for Web and multimedia content. Client accelerators also provide advanced content filtering services to allow users access to appropriate content only—according to policies set by the enterprise or service provider.

Content on the Internet is moving beyond just HTTP traffic to include rich multimedia. Enterprises will deliver corporate intranet broadcasts of special events and executive speeches, offer online training to employees, and deliver time-critical information to partners. ISPs will serve audiences with a wide variety of revenue-enhancing content services personalized for subscribers. For all of these streaming media applications, a client accelerator dramatically improves the user experience by storing the content closer to the user to enable a higher quality viewing and listening experience than is otherwise possible. And, by distributing multimedia content to the edge closer to users, organizations can offload data traffic from Internet or WAN links, saving bandwidth over large portions of the network.

These high-end client accelerator products deliver the ultimate performance and reliability for data center locations and other sites where high-bandwidth and throughput are required. The CA-6000 Series support up to 200 Mbps, offer multiple levels of redundancy, require little maintenance, and easily grow with your network.

### Customers and Applications

The CA-6000 Series is essential for any organization looking to optimize bandwidth utilization, realize the promise of streaming media, and increase productivity. Specific organizations and applications that will benefit from a CA-6000 are:

#### Enterprise, Government Organizations and Educational Institutions

- > Maximize WAN bandwidth utilization and reduce costs
- > Dramatically improved Web page response time
- > Provide secure, fast access to mission-critical information within distributed network environments

#### ISPs

- > Increase revenue through subscriber based, value-added content filtering services
- > Maximize WAN bandwidth utilization and reduce costs
- > Improved customer retention by reducing response times

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## Platform and Software Features

The CA-6000 Series combines the patent-pending CacheOS™ software with modular hardware configurations to deliver unmatched performance, flexibility and scalability. As the recognized leader in content acceleration appliances, CacheFlow—along with industry leading Adaptive Content Exchange (ACE) partners—delivers a complete, award-winning feature set.

### Key Platform Features

#### Optimized Hardware Configuration for Client Acceleration

- > Specialized system architecture
- > Multiple processors for increased performance

#### High Availability Architecture

- > Up to (8) disk drives and (2) power supplies, both hot-swappable
- > Redundant network interfaces provide load balancing and fault tolerance
- > Ability to cluster multiple devices through standard protocols

#### Front Panel Configuration

- > Joystick device easily sets the initial network configuration in minutes
- > LCD eliminates the need to connect terminal interface for initial configuration

#### Configuration Restoration

- > Archives all system settings, filtering and access control policies
- > Archive can be loaded to the Client Accelerator from an HTTP, FTP, or TFTP server in the rare case of system failure

#### Simple to Manage Appliance

- > Installs in minutes; little ongoing maintenance required
- > Automatic, fast system reboot in the event of an outage

#### Disk Expansion Kit (Optional)

- > Provides additional high-speed storage integrated with the CA-6285 base unit

### Key Software Features

Standards-based Proxy Authentication and Policy Control—Enables administrators to manage user access with standard LDAP and RADIUS protocols and exportable reports.

Content filtering—Enables Internet policies that can manage, restrict and log Web access through integrated solutions from Websense™ and Secure Computing. Enables administrators to easily block objectionable sites and significantly minimize potential legal, productivity or resource utilization problems.

Multimedia Services—Certified support for major streaming media formats optimize live and on-demand streaming content. Includes RealProxy™, Microsoft® Windows Media™, Apple® QuickTime™, MP3 and Flash.

Adaptive Refresh—Patent-pending technology that ensures users always receive up-to-the-second content by proactively updating cached content based on usage patterns, frequency of requests, and time required to retrieve Web objects.

Rules-Based Filtering and Forwarding—Powerful rules library that makes it easy to create sophisticated filtering and forwarding policies applied to individuals or an entire organization.

Real-Time Logging and Event Notification—Enables system event logging and allows administrators to specify events to be logged, size of event log, and email alerts for occurring events.

DNS Caching—Enables caching of DNS entries to boost overall performance by eliminating latencies inherent in contacting a DNS server.

Management—Available in a Web-based graphical user interface and command line interface for managing, configuring, monitoring and upgrading the client accelerator remotely.

Content Manager—Allows administrators to view, distribute, monitor and delete content from a network of distributed caches on a scheduled or dynamic basis.

Web Object Pipelining—Sends parallel requests to the host server, reducing wait time even when the data is not yet cached. Reduces wait time by 50% when Web content is first requested.

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## Client Accelerator 6000 Series

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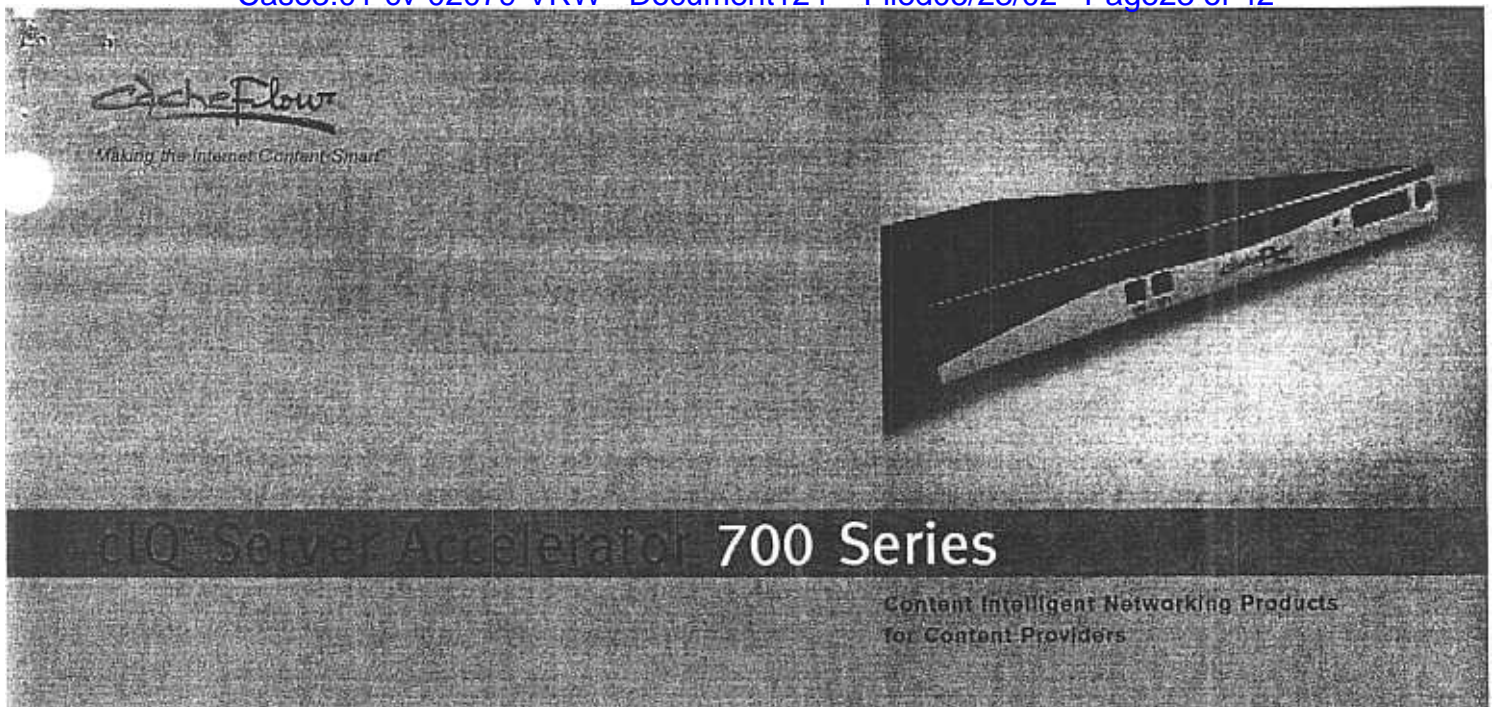
### Configuration & Specification Chart

	Model CA-6025	Model CA-6045	Model CA-6085	Model CA-6285
<b>System</b>				
Disk drives	2 x 18 GB Ultra2 SCSI	4 x 18 GB Ultra2 SCSI	8 x 18 GB Ultra2 SCSI	8 x 18 GB Ultra2 SCSI (Optional CA-6585* expansion kit allows for additional 8 x 18 GB Ultra2 SCSI)
RAM	768 MB	1.28 GB	2.5 GB	4 GB
Network Interfaces	(1) integrated; supports up to (3) additional 10/100/1000 Base-T interfaces	(1) integrated; supports up to (3) additional 10/100/1000 Base-T interfaces	(1) integrated; supports up to (3) additional 10/100/1000 Base-T interfaces	(1) integrated; supports up to (3) additional 10/100/1000 Base-T interfaces
<b>Client Accelerator</b>				
WAN Throughput	35 Mbps	75 Mbps	150 Mbps	200 Mbps
	CacheOS* 3.1	CacheOS* 3.1	CacheOS* 3.1	-
Event logging, SSH, Performance monitoring and reporting, SNMP, Advanced routing and load balancing, clustering, automatic fast restart, HTTP 1.0 and 1.1, WCCP v1 and v2				
<b>Enclosure</b>				
19" Rack-mountable	Yes	Yes	Yes	Yes
<b>Power</b>				
	AC power 100-240V, 47-63Hz; 300 Watts	AC power 100-240V, 47-63Hz; 300 Watts	AC power 100-240V, 47-63Hz; 300 Watts	AC power 100-240V, 47-63Hz; 300 Watts
<b>Operating Environment</b>				
Temperature	5°C to 50°C (41°F to 122°F)	5°C to 50°C (41°F to 122°F)	5°C to 50°C (41°F to 122°F)	5°C to 50°C (41°F to 122°F)
Humidity	Less than 90% relative humidity, non-condensing	Less than 90% relative humidity, non-condensing	Less than 90% relative humidity, non-condensing	-
Altitude	Up to 2438 M (8000 ft)	Up to 2438 M (8000 ft)	Up to 2438 M (8000 ft)	-
<b>Dimensions and Weight</b>				
Height	177.8 mm (7.0 in); 4 rack units	177.8 mm (7.0 in); 4 rack units	177.8 mm (7.0 in); 4 rack units	177.8 mm (7.0 in); 4 rack units
Width	442 mm (17.4 in)	442 mm (17.4 in)	442 mm (17.4 in)	-
	603.25 mm (23.75 in)	603.25 mm (23.75 in)	603.25 mm (23.75 in)	-
	22.93kg (50.55 lb)	24.89kg (54.85 lb)	27.67kg (61 lb)	-
	FCC Class A, EN55022 Class A			
	CSA C22.2 No. 950 M95, UL 1950 3 Edition, IEC EN60950			
	Standard warranty: 1-year hardware and 90-day software and technical phone support, including 90-day CacheSupport 24x7; extended and upgraded support plans available			

\* The CA-6585 expansion kit weighs 28.19kg (62.15 lb) and has the same height, width and depth measurements as the CA-6285 listed above

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**The SA-700 Series delivers:**

- > 50 to 80% faster response times for Web site users
- > Up to 5 to 10 times higher site scalability to handle growing traffic volumes
- > Up to 90% lower space and power requirements
- > Significant capital and operational cost savings
- > Dramatically improved customer satisfaction and loyalty

**Serve More Customers through a Lower-Cost Infrastructure**

Within today's Web site architectures, Web servers are responsible for delivering all content to requesting users. However, under the pressures of rising traffic volumes, richer content types and increasing user expectations, these server-dependent infrastructures experience significant strain.

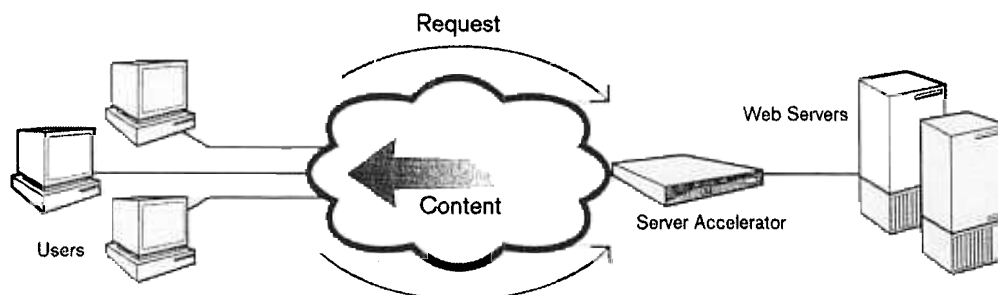
The CacheFlow Server Accelerator 700 Series, an integral component of the CacheFlow clQ™ Content Delivery Architecture, is the only solution specifically built to offload Web servers from content delivery tasks. The SA-700 Series reduces stress on servers and enhances a site's performance and scalability by processing up to 95% of the inbound page requests.

Due to its optimized architecture, a single CacheFlow Server Accelerator can deliver the performance and scalability of 5 to 10 Web servers.

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# cdQ Server Accelerator 700 Series



The SA-700 services up to 95% of a site's inbound requests, delivering content directly to users and offloading Web servers. The server accelerator will deliver both public (HTTP) and private (HTTPS) content, whether that content is static or dynamic in nature.

## Overview

### Industry-Unique Solution

The SA-700 Series is specifically designed to improve the performance, scalability, security and manageability of high-traffic Web sites. The platform is packaged in a compact 1U form factor, a major advantage in space-constrained data centers. The SA-700 hardware is optimized for Web server acceleration, featuring a high RAM-to-disk ratio and a built-in Secure Sockets Layer (SSL) encryption/decryption processor. This processor can manage 10 to 40 times more secure sessions than a standard Web server, allowing the SA-700 to accelerate the delivery of both public (HTTP) and private (HTTPS) content.

The SA-700's system software, called CacheOS™ Server Edition, is expressly tuned for the workload of a high-traffic Web site. This environment is characterized by a finite amount of site content and access by millions of users from around the world—dimensions which are exactly opposite of traditional caching scenarios. Further, the software includes advanced features like an intelligent "Akamaiizer", which automatically prepares content for the Akamai FreeFlow<sup>SM</sup> network, and protection against Denial-of-Service attacks, which can crash a Web site.

As a true Internet appliance, the SA-700 Series installs in minutes, reduces power consumption, and requires little ongoing maintenance.

Administrators have the flexibility of interfacing with the SA-700 through a browser-based GUI or through a command-line that can be secured using SSH.

## Customers and Applications

The SA-700 Series is essential for any Web site that needs to accelerate performance and scale traffic levels, without expensive server build-outs. Specific organizations and applications that will benefit from the SA-700 are:

### E-commerce, E-business, Content and Portal Sites

- > Deliver a higher quality experience to visitors
- > Generate more revenue and increase customer loyalty

### Enterprises

- > Accelerate Intranet/Extranet content to employees, partners and customers
- > Increase organizational productivity and streamline the supply chain

### Web Hosting Providers

- > Deploy server accelerators within a hosted customer's infrastructure
- > Grow revenues through a high-value service offering

In addition to its robust core functionality, the SA-700 integrates with leading solutions from CacheFlow ACE partners to optimize content publishing, request load balancing, content distribution and site reporting. This integration allows sites to build world-class content intelligent networks.

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## Platform and Software Features

The SA-700 Series is the industry's only solution specifically engineered to accelerate and scale Web sites. The SA-700 is designed to seamlessly integrate with a site's existing systems and networks, delivering an immediate performance impact. The following capabilities of the SA-700 will help high-traffic Web sites to serve more customers through a lower cost infrastructure.

### Key Platform Features

#### Optimized Configuration for Web Server Acceleration

- > High RAM-to-disk ratio
- > Specialized system architecture

#### Superior Price/Performance

- > Generates 100Mbps of data throughput

#### Optimized Power Utilization

- > Only outputs 100 Watts

#### Space-Friendly 1U (<1.75") Form Factor

- > Delivers real estate cost savings

#### Integrated SSL Cryptographic Processor

- > Processes 400 key negotiations per second, ~20 times the power of a standard Web server

#### Simple to Manage Appliance

- > Installs in minutes; little ongoing maintenance required

### Key Software Features

#### CacheOS™ Server Edition

- > Industry's only system software that is tuned for the workload of a high-traffic Web site

#### CacheFlow Content Manager (optional)

- > Intelligent synchronization and management of content across a distributed network of server accelerators

#### CacheFlow Intelligent Akamaiizer

- > Automatically readies content for the Akamai FreeFlow service
- > Combined CacheFlow/Akamai solution allows sites to scale globally and gracefully handle peak events

#### Secure Content Acceleration

- > Can accelerate both public (HTTP) and private (HTTPS) content through integrated SSL functionality
- > Can establish an SSL session back to the origin Web server, enabling secure communication across a distributed network

#### Dynamic Content Acceleration

- > Accelerates all content that is not unique to a user, including dynamically generated pages
- > Accelerates all images within user-specific pages

#### Denial of Service (DoS) Protection

- > Prevents sites from crashing during hacker-initiated DoS attacks
- > Server accelerator distinguishes between valid and malicious connections, servicing users while resisting the attack

#### Robust Security

- > Certified by a leading security audit firm for safe placement outside the firewall

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## cIQ Server Accelerator 700 Series

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## Configuration &amp; Specification Chart

	Model SA-710	Model SA-725	Model SA-745
<b>System</b>			
Disk drives	1 x 20 GB IDE	2 x 18 GB Ultra-Wide SCSI	4 x 18 GB Ultra-Wide SCSI
	512 MB	1 GB	
	(2) 10/100 Base-T	(2) 10/100 Base-T	
	Integrated; 200 key negotiations/sec	Integrated; 400 key negotiations/sec	
	50 Mbps	100 Mbps	See below <sup>2</sup>
	Up to 500 MB	Up to 1 GB	
	CacheOS <sup>®</sup> Server Edition	CacheOS <sup>®</sup> Server Edition	
	SSL v2.0 and v3.0, TTL insertion, DoS Protection, Event Logging, Cookie Logging, SSH, Performance Monitoring and Reporting, SNMP, Advanced Routing and Load Balancing, Clustering, Automatic Fast Restart, Log File Formats (Common, Squid, Custom), HTTP 1.0 and 1.1 WCCP v1 and v2, Caching Authenticated Content, Packet Capture		
<b>Enclosure</b>			
19" Rack-mountable	Yes	Yes	Yes
<b>Power</b>	AC power 100-230V, 47-63Hz; 100 Watts	AC power 100-230V, 47-63Hz; 100 Watts	AC power 100-230V, 47-63Hz; 100 Watts
<b>Operating Environment</b>			
Temperature	5°C to 40°C (41°F to 104°F)	5°C to 40°C (41°F to 104°F)	5°C to 40°C (41°F to 104°F)
Humidity	Less than 90% relative humidity, non condensing	Less than 90% relative humidity, non condensing	
Altitude	Up to 2438 M (8000 ft)	Up to 2438 M (8000 ft)	
<b>Dimensions and Weight</b>			
Height	44 mm (1.72 in); 1 rack unit	44 mm (1.72 in); 1 rack unit	44 mm (1.72 in); 1 rack unit
Width	442 mm (17.4 in)	442 mm (17.4 in)	
	635 mm (25 in)	635 mm (25 in)	
	7.8 kg (17.2 lb)	8.75 kg (19.3 lb)	

FCC Class A, EN 55022 Class A

CSA C22.2 No. 950 M95, UL 1950 3 Edition, IEC 60950

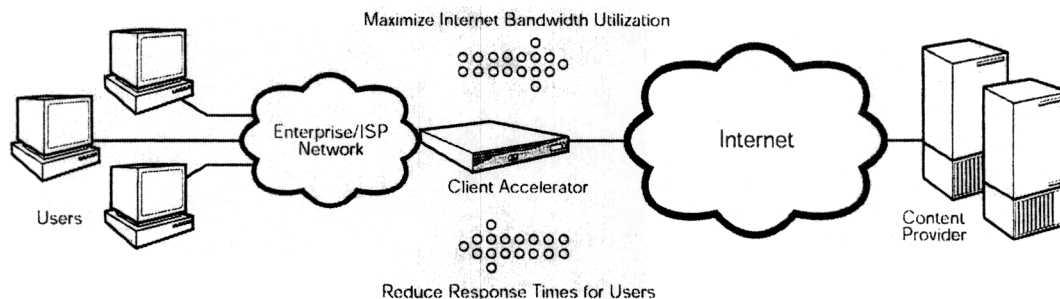
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Standard warranty: 1-year 24x7 technical support, 90-day next-business-day hardware replacement; extended and upgraded support plans available

<sup>1</sup> Server accelerators are sized according to the amount of throughput required and the working set size. The working set is defined as the amount of unique content served over the course of a day. A server accelerator will deliver maximum performance when working set content is served directly from RAM.

<sup>2</sup> The SA-745 is optimized for Web sites with a high degree of large-file content types. The size of these sites dictates that all content will not fit into RAM, and the majority must therefore be served from disk (which has throughput implications). The SA-745 is built with a large storage capacity to fit the data characteristics of these rich content Web sites.

## CacheFlow 600 Series



**CacheFlow client accelerators store web content locally and typically deliver on 60% or more of all user requests. The result is an extremely fast Internet experience for users and more efficient bandwidth utilization for Enterprises and ISPs.**

### Overview

#### Industry-Leading Solution

For the typical organization, web traffic will continue to double every three months. The CA-600 Series of client accelerators are used by enterprises, ISPs, and other organizations worldwide to manage and control this growth, while accelerating the delivery of content to users.

#### Intelligent Content Delivery

The CacheFlow Client Accelerator sits between users and the Internet and intelligently manages requests for content. When a user selects a URL, the request goes first to the CacheFlow accelerator. If the objects from the requested page are stored locally in the client accelerator, they are immediately served to the user. If the objects are not stored locally, the client accelerator communicates to the origin server via the Internet. When the objects are returned from the origin server, the client accelerator delivers a copy to the user and also stores a copy to serve subsequent requests.

Since CacheFlow Client Accelerators "see" every request for Web content, they are ideal for deciding if access to the requested content is appropriate—according to policies set by the enterprise or service provider. The CA-600 products offer advanced content filtering services that check each user request against a comprehensive database of potentially objectionable sites, efficiently organized by category to make policy

administration simple and manageable. This significantly minimizes potential legal, productivity or resource utilization repercussions.

Finally, as a true appliance, CacheFlow Client Accelerators are easy to install and administer. Couple this with a world-class support organization, an attractive price, and the ability to outperform any conventional caching product, and it's easy to understand why these products have been the recipient of numerous industry awards and accolades.

### Customers and Applications

The CA-600 Series is essential for any organization looking to maximize the benefits of the Internet. Specific organizations and applications that will benefit from a CA-600 are:

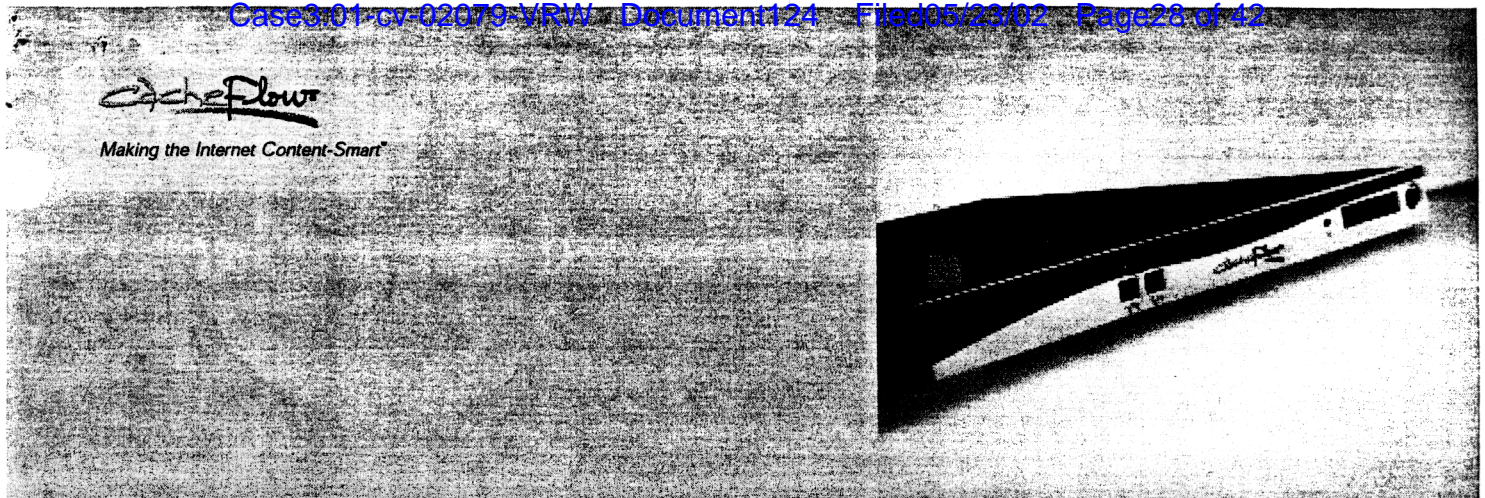
#### Enterprise, Government Organizations and Educational Institutions

- > Maximize WAN bandwidth utilization and reduce costs
- > Dramatically improve web page response time
- > Provide fast access to mission-critical information within distributed network environments

#### ISPs

- > Increase revenue through subscriber based, value-added content filtering services
- > Maximize bandwidth utilization and reduce costs
- > Improve customer retention by reducing response times





**600 Series**

**Content Intelligent Networking Products  
for Enterprises and ISPs**

**The CA-600 Series delivers:**

- > Up to 10 times improvement in Internet and intranet response times
- > Scalability of existing network infrastructure to support growing content requirements
- > Up to 60% reduction in WAN bandwidth utilization
- > Optimized delivery of on-demand and live streaming media content
- > Advanced content filtering to restrict access to inappropriate web sites

**Maximize Return on Network Assets**

As the Web's strategic importance has grown, more users demand the highest quality Internet experience available. And the growth of the Internet—along with the availability of richer multimedia content—places unprecedented demands on the network infrastructure of ISPs and enterprises.

The CacheFlow Client Accelerator 600 Series are high performance Internet appliances that enhance the end-user experience and scale existing network infrastructure by intelligently moving content closer to users

"The most well-rounded offering in our cache appliance group—and hands-down *Editors Choice*—is CacheFlow."

PC MAGAZINE

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## Platform and Software Features

The CA-600 Series combines the patent-pending CacheOS™ software with robust hardware configurations to deliver unmatched performance, manageability and scalability. The platform is packaged in a compact 1U form factor to provide a major advantage in space-constrained data centers and enterprise environments. As the recognized leader in content acceleration appliances, CacheFlow—along with industry-leading Adaptive Content Exchange (ACE) partners—delivers a complete, award-winning feature set.

### Key Platform Features

#### Optimized Configuration for Client Acceleration

- > Large disk capacity to efficiently manage Internet content

#### Space Friendly 1U (<1.75") Form Factor

- > Delivers real estate cost savings

#### Front Panel LCD and Joystick Device

- > Provides a quick and easy method for setting the Content Accelerator's initial network configuration
- > Eliminates the need to connect terminal interface for initial configuration

#### Configuration Restoration

- > Allows system configuration to be archived, including all system settings, filtering and access control policies
- > Archive can be loaded to the Client Accelerator from an HTTP, FTP, or TFTP server in the rare case of system failure

#### Simple to Manage Appliance

- > Installs in minutes; little ongoing maintenance required

### Key Software Features

Standards-Based Proxy Authentication and Policy Control—Enables administrators to manage which users can access the Internet using LDAP and RADIUS protocols and provides exportable reporting and logging information.

Content Filtering—Allows organizations to implement Internet policies to manage, restrict and log

user access to web content through integrated, subscription-based solutions from Websense™ and Secure Computing.

Multimedia Services—Certified support for major streaming media formats which optimize live and on-demand streaming content for improved viewing and listening quality. Multimedia support includes RealProxy™, Microsoft Windows Media, Apple QuickTime, MP3 and Flash.

Adaptive Refresh—Patent-pending technology that ensures users always receive "fresh" and up-to-date content by intelligently communicating with origin web servers and proactively updating cached content based on usage patterns, frequency of requests, and time required to retrieve web objects.

Rules-Based Filtering and Forwarding—Powerful rules library that makes it easy to create sophisticated filtering and forwarding policies applied to individuals or an entire organization.

Real-time Logging and Event Notification—Enables the logging of system events, and allows administrators to specify events to be logged, size of event log, and email alerts for occurring events.

DNS Caching—Enables caching of DNS entries to boost overall performance by eliminating latencies inherent in contacting a DNS server.

Transparent Caching—Allows all HTTP requests to be transparently redirected to the CacheFlow appliance from any Layer 4 switch or WCCP enabled router, and simplifies deployment by eliminating the need to configure individual browsers.

Management—Available both in a web-based graphical user interface and command line interface for managing, configuring, monitoring and upgrading the client accelerator remotely.

Content Manager—Allows administrators to view, distribute, monitor and purge content from a network of distributed caches on a scheduled or dynamic basis.

Web Object Pipelining—Allows parallel requests to the host server, thus reducing wait time even when the data is not available in the cache. Results in 50% reduction in wait time on first requests to web sites.

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## 600 Series

### Configuration & Specification Chart

	Model CA-610	Model CA-615	Model CA-625	Model CA-645
<b>System</b>				
Disk drives	1 x 4 GB IDE	1 x 18 GB Ultra-Wide SCSI	2 x 18 GB Ultra-Wide SCSI	4 x 18 GB Ultra-Wide SCSI
	128 MB	384 MB	768 MB	
	(2) 10/100 Base-T Ethernet	(2) 10/100 Base-T Ethernet	(2) 10/100 Base-T Ethernet	
	9.5-10.5 Mbps	12.5-26 Mbps	26-52 Mbps	52-104 Mbps
	CacheOS™	CacheOS™	CacheOS™	
	Event logging, SSH, Performance monitoring and reporting, SNMP, Advanced routing and load balancing, clustering, automatic fast restart, HTTP 1.0 and 1.1, WCCP v1 and v2			
<b>Enclosure</b>				
19" Rack-mountable	Yes	Yes	Yes	Yes
<b>Power</b>	AC power 100-230V, 47-63Hz	AC power 100-230V, 47-63Hz	AC power 100-230V, 47-63Hz	AC power 100-230V, 47-63Hz
<b>Operating Environment</b>				
Temperature	5°C to 40°C (41°F to 104°F)	5°C to 40°C (41°F to 104°F)	5°C to 40°C (41°F to 104°F)	5°C to 40°C (41°F to 104°F)
Humidity	Less than 90% relative humidity, humidity, non-condensing	Less than 90% relative humidity, humidity, non-condensing	Less than 90% relative humidity, humidity, non-condensing	
Altitude	Up to 2438 M (8000 ft)	Up to 2438 M (8000 ft)	Up to 2438 M (8000 ft)	
<b>Dimensions and Weight</b>				
Height	44 mm (1.72 in); 1 rack unit	44 mm (1.72 in); 1 rack unit	44 mm (1.72 in); 1 rack unit	44 mm (1.72 in); 1 rack unit
Width	442 mm (17.4 in)	442 mm (17.4 in)	442 mm (17.4 in)	
	635 mm (25 in)	635 mm (25 in)	635 mm (25 in)	
	7.8 kg (17.2 lb)	7.8 kg (17.2 lb)	8.75 kg (19.3 lb)	10.43 kg (23 lb)
	FCC Class A, EN 55022 Class A			
	CSA C22.2 No. 950 M95, UL 1950 3 Edition, IEC 60950			
	Standard warranty: 1-year 24x7 technical support, 90-day next-business-day hardware replacement; extended and upgraded support plans available			

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Case No. CV-01-2079  
VRW USDC NDCA

## CacheOS 4.1 Management and Configuration Guide

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The `domain_alias` directive prevents duplication of content in the accelerator when the same web content can be retrieved using multiple domain names. For example, if the origin web server's IP address is associated with multiple DNS names.

The forwarding configuration for CacheOS can include multiple instances of the `domain_alias` directive. The parameters for the `domain_alias` directive are described below:

Parameter	Description
Original Domain	This is the domain name which appears in the original request from a client application.
New Domain	This is the domain name which replaces the domain name in the original request from the client application.

For example, given the directive "`domain_alias abc.cacheflow.com www.cacheflow.com`", a request for the URL "`http://abc.cacheflow.com/documents/readme.htm`" are converted to a request for the URL "`http://www.cacheflow.com/documents/readme.htm`."

**Important** The `domain_alias` directive works only in transparent mode. In explicit mode, `domain_alias` directives are ignored. Also, note that the `domain_alias` directive is intended to alias only the domain portion of URLs, and not specific objects.

## Configuring ICP

An ICP cache hierarchy is comprised of a group of caches with defined parent and sibling relationships. A relationship exists between two caches. A cache parent is a cache that can return the object if it is in the cache, or request the object from the source on behalf of the requester if the object is not in the cache. A cache sibling is a cache that can only return the object if it is in the cache. One cache acting as a parent can also act as a sibling to other caches.

1. The ICP conversation between caches is simple:
2. When an object is not in the cache, the cache sends an ICP query to its neighbors (parents and siblings) to see if any of its peers holds the object.
3. Each neighbor that holds the requested object returns an ICP\_HIT reply.
4. Each neighbor that does not hold the object returns an ICP\_MISS reply.

Based on the responses, the cache can determine where to request the object: from one of its neighbors, or from the source. If an ICP\_HIT reply is received, the request is sent to the cache host that returned the first reply. If no ICP\_HIT reply is received, the request is forwarded to the first parent that replied. If no parents respond or are configured, the request is made directly to the source.

## ICP Configuration Directives

To configure ICP you must create a configuration file and load it on the Accelerator. The ICP configuration is defined in the shared ICP/Forwarding configuration file. For information on loading the configuration using the command line interface, see the `icp` command. For information on loading an `icp` configuration using the Web interface, see the previous chapter.

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File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print Mail News RSS Feeds

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CONTACT US | SITE MAP |

 SEARCH

SOLUTIONS SALES PARTNERS SUPPORT NEWS ABOUT US

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### CONTENT DELIVERY SOLUTIONS

#### enterprise

streaming intranet  
secure intranet  
proxy

#### managed service provider

bandwidth gain  
hosting solutions

#### content provider

web server acceleration  
ecommerce acceleration

### PRODUCTS

client accelerator 600  
client accelerator 6000

#### overview

features  
specifications  
data sheet (pdf)  
software add-ons

server accelerator 700  
server accelerator 7000  
cIQ Director  
cIQ Streaming Services  
cIQ Filtering Services

### TECHNOLOGY

overview  
cIQ CacheOS™  
cIQ CacheOS Server Ed.™  
white papers  
testing tools  
cdn resources

### cIQ RESOURCES

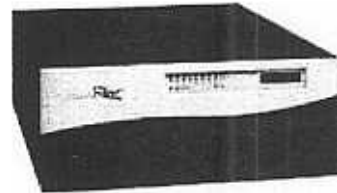
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cIQ Brochure [pdf]  
cIQ FAQ  
cIQ Impact Report  
cIQ ppt presentation  
cIQ Press Release  
What is cIQ? [pdf]

## Products

### CacheFlow 6000

#### overview

features  
specifications  
data sheet (pdf)  
software add-ons



CacheFlow Client Accelerators 6000 Series consists of high performance content delivery solutions for enterprises, ISPs, educational institutions and government agencies. Client Accelerators enable organizations to effectively manage, distribute and accelerate content with unmatched speed and efficiency.

The CA-6000 is deployed between users and the Internet, and intelligently manages requests for Web and multimedia content. Client accelerators also provide advanced content filtering services to allow users access to appropriate content only - according to policies set by the enterprise or service provider.

Content on the Internet is moving beyond just HTTP traffic to include rich multimedia. Enterprises will deliver corporate intranet broadcasts of special events and executive speeches, offer online training to employees, and deliver time-critical information to partners. ISPs will serve audiences with a wide variety of revenue-enhancing content services personalized for subscribers. For all of these streaming media applications, a client accelerator dramatically improves the user experience by storing the content closer to the user to enable a higher quality viewing and listening experience than is otherwise possible. And, by distributing multimedia content to the edge closer to users, organizations can offload data traffic from Internet or WAN links, saving bandwidth over large portions of the network.

These high-end client accelerator products deliver the ultimate performance and reliability for data center locations and other sites

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Case No. CV-01-2079  
VRW USDC NDCA



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File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print Mail News RSS Feeds

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**CONTENT DELIVERY SOLUTIONS**

**enterprise**

- streaming intranet
- secure intranet
- proxy

**managed service provider**

- bandwidth gain
- hosting solutions


**content provider**

- web server acceleration
- ecommerce acceleration

**Products**

**CacheFlow 600**

- overview
- features
- specifications
- data sheet (pdf)
- software add-ons



**PRODUCTS**

- client accelerator 600
  - overview
  - features
  - specifications
  - data sheet (pdf)
  - software add-ons
- client accelerator 6000
- server accelerator 700
- server accelerator 7000
- ciQ Director
- ciQ Streaming Services
- ciQ Filtering Services

**TECHNOLOGY**

- overview
- ciQ CacheOS™
- ciQ CacheOS Server Ed.™
- white papers
- testing tools
- cdn resources

**ciQ RESOURCES**

- ciQ Ad Campaign [pdf]
- ciQ Brochure [pdf]
- ciQ FAQ
- ciQ Impact Report
- ciQ ppt presentation
- ciQ Press Release
- What is ciQ? [pdf]

The CA-600 Series of client accelerators are used by enterprises, ISP's, and other organizations worldwide to manage and control Web traffic growth, while accelerating the delivery of content to users. The CacheFlow Client Accelerator is deployed between users and the Internet or at remote sites, and intelligently manages requests for content. When a user selects a URL, the request goes first to the CacheFlow accelerator. If the objects from the requested page are stored locally in the client accelerator, they are immediately served to the user. If the objects are not stored locally, the client accelerator communicates to the origin server via the Internet. When the objects are returned from the origin server, the client accelerator delivers a copy to the user and also stores a copy to serve subsequent requests.

Since CacheFlow Client Accelerators "see" every request for Web content, they are ideal for deciding if access to the requested content is appropriate - according to policies set by the enterprise or service provider. The CA-600 products offer advanced content filtering services that check each user request against a comprehensive database of potentially objectionable sites, efficiently organized by category to make policy administration simple and manageable. This significantly minimizes potential legal, productivity or resource utilization repercussions.

The CA-600 Series combines the patent-pending ciQ CacheOS™ software with robust hardware configurations to deliver unmatched performance, manageability and scalability. The platform is

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Case No. CV-01-2079  
VRW USDC NDCA

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File	Edit	View	Favorites	Tools	Help
Back          Forward          Home          Search          Favorites          History          Print          Mail          New window          Stop          Reload					
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SEARCH

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### CONTENT DELIVERY SOLUTIONS

#### enterprise

streaming intranet  
secure intranet  
proxy

#### managed service provider

bandwidth gain  
hosting solutions

#### content provider

web server acceleration  
ecommerce acceleration

### PRODUCTS

client accelerator 600  
client accelerator 6000  
server accelerator 700  
server accelerator 7000

#### overview

#### features

specifications  
data sheet (pdf)  
software add-ons

ciQ Director

ciQ Streaming Services

ciQ Filtering Services

### TECHNOLOGY

#### overview

ciQ CacheOS™

ciQ CacheOS Server Ed.™

white papers

testing tools

cdn resources

### ciQ RESOURCES

ciQ Ad Campaign [pdf]

ciQ Brochure [pdf]

ciQ FAQ

ciQ Impact Report

ciQ ppt presentation

ciQ Press Release

What is ciQ? [pdf]

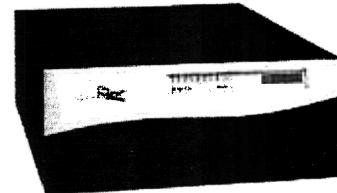
## Products

### CacheFlow 7000

overview

#### features

specifications  
data sheet (pdf)  
software add-ons



The SA-7000 Series is the industry's premier solution for accelerating and scaling business-critical Web sites. The SA-7000 is designed to seamlessly integrate with a site's existing systems and networks, delivering an immediate performance impact. The following capabilities of the SA-7000 help high-traffic Web sites to serve more customers through a lower-cost infrastructure.

### Key Platform Features

#### Optimized Configuration for Web Server Acceleration

- High RAM-to-disk ratio
- Specialized system architecture

#### Industry-Leading Content Delivery Horsepower

- Dual 800MHz CPUs
- Generates 400 Mbps of data throughput

#### SSL Cryptographic Processors

- Supports up to (4) Processors
- Processes up to 800 key negotiations per second, ~40 times the power of a standard Web server

#### Data Center-Class High Availability

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Case No. CV-01-2079  
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CONTACT US | SITE MAP |



SOLUTIONS | SALES | PARTNERS | SUPPORT | NEWS | ABOUT US

## cIQ Solutions

### CONTENT DELIVERY SOLUTIONS

#### enterprise

- streaming intranet
- secure intranet
- proxy

#### managed service provider

- bandwidth gain
- hosting solutions

#### content provider

- web server acceleration
- ecommerce acceleration

### PRODUCTS

- client accelerator 600
- client accelerator 6000
- server accelerator 700
- server accelerator 7000

#### overview

- features
- specifications
- data sheet (pdf)
- software add-ons

- cIQ Director
- cIQ Streaming Services
- cIQ Filtering Services

### TECHNOLOGY

- overview
- cIQ CacheOS™
- cIQ CacheOS Server Ed.™
- white papers
- testing tools
- cdn resources

### cIQ RESOURCES

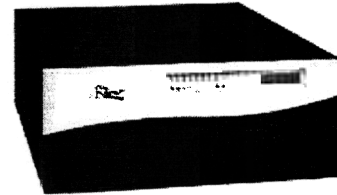
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- cIQ Brochure [pdf]
- cIQ FAQ
- cIQ Impact Report
- cIQ ppt presentation
- cIQ Press Release
- What is cIQ? [pdf]

## Products

### CacheFlow 7000

#### overview

- features
- specifications
- data sheet (pdf)
- software add-ons



The Server Accelerator 7000 Series is specifically designed to improve the performance, scalability, security and manageability of high-traffic Web sites. Deployed in minutes "in front of" any Web server, the SA-7000 dramatically accelerates the delivery of Web content to users and typically serves five to ten times the content of a single Web server.

The SA-7000 Series is expressly tuned for the workload of a high-traffic Web site. This environment is characterized by a finite amount of site content and access by millions of users from around the world - characteristics that are the exact opposite of traditional caching scenarios. To accommodate this unique application, the SA-7000's hardware architecture and cIQ CacheOS™ Server Edition software are optimized to handle heavy transaction loads. Additionally, the SA-7000 products integrate Secure Sockets Layer (SSL) capabilities to offload CPU-intensive HTTPS sessions, enabling the management of 40 times more secure sessions than a standard Web server. The SA-7000 also includes advanced features like an intelligent "Akamaizer," which automatically prepares content for the Akamai FreeFlow network, and protection against malicious Denial-of-Service attacks, designed to crash Web sites.

As a true Internet appliance, the SA-7000 Series installs in minutes and requires little ongoing maintenance. Administrators have the flexibility of interfacing with the SA-7000 through a browser-based GUI or through a secure command-line utility.

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Case No. CV-01-2079  
VRW USDC NDCA

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CONTACT US | SITE MAP

SEARCH

SOLUTIONS | SALES | PARTNERS | SUPPORT | NEWS | ABOUT US

## cIQ Solutions

### CONTENT DELIVERY SOLUTIONS

#### enterprise

streaming intranet  
secure intranet  
proxy

#### managed service provider

bandwidth gain  
hosting solutions

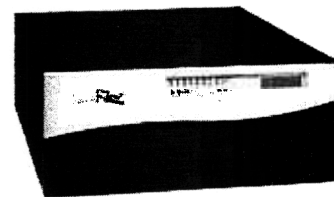
#### content provider

web server acceleration  
ecommerce acceleration

### Products

#### CacheFlow 7000

overview  
features  
specifications  
data sheet (pdf)  
software add-ons



### PRODUCTS

client accelerator 600  
client accelerator 6000  
server accelerator 700  
server accelerator 7000  
overview  
features  
specifications  
data sheet (pdf)  
software add-ons

cIQ Director  
cIQ Streaming Services  
cIQ Filtering Services

### TECHNOLOGY

overview  
cIQ CacheOS™  
cIQ CacheOS Server Ed.™  
white papers  
testing tools  
cdn resources

### cIQ RESOURCES

cIQ Ad Campaign [pdf]  
cIQ Brochure [pdf]  
cIQ FAQ  
cIQ Impact Report  
cIQ ppt presentation  
cIQ Press Release  
What is cIQ? [pdf]

### CacheFlow Akamaizer

Intelligently and dynamically readies content for the Akamai FreeFlow™ service based on site-specific policies. In doing so, the Akamaizer removes any administrative burden from the process of distributing Web content and ensures that pages are delivered as quickly as possible to the end user.

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### CacheFlow Content Manager

Allows users to view, distribute, monitor, and purge their content from a network of distributed caches on a scheduled or an ad hoc basis. Content providers today are finding an increasing need to intelligently monitor, deliver and control their content, whether that content is located on a web server, on a Server Accelerator, or distributed around the country or the world.

- datasheet

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File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print Mail News RSS Feeds

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CONTACT US | SITE MAP |

SEARCH

SOLUTIONS SALES PARTNERS SUPPORT NEWS ABOUT US

## cIQ Solutions

## CONTENT DELIVERY SOLUTIONS

## enterprise

streaming intranet  
secure intranet  
proxy

## managed service provider

bandwidth gain  
hosting solutions

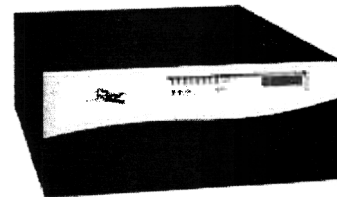
## content provider

web server acceleration  
ecommerce acceleration

## Products

## CacheFlow 7000

overview  
features  
specifications  
data sheet (pdf)  
software add-ons



## PRODUCTS

client accelerator 600  
client accelerator 6000  
server accelerator 700  
server accelerator 7000  
overview  
features  
specifications  
data sheet (pdf)  
software add-ons  
cIQ Director  
cIQ Streaming Services  
cIQ Filtering Services

## TECHNOLOGY

overview  
cIQ CacheOS™  
cIQ CacheOS Server Ed.™  
white papers  
testing tools  
cdn resources

## cIQ RESOURCES

cIQ Ad Campaign [pdf]  
cIQ Brochure [pdf]  
cIQ FAQ  
cIQ Impact Report  
cIQ ppt presentation  
cIQ Press Release  
What is cIQ? [pdf]

	Model SA-7225	Model SA-7285
System		
Disk Drives	2x18 GB Ultra2 SCSI	8x18 GB Ultra2 SCSI
RAM	4 GB	4 GB
Network Interfaces	(1) integrated; supports up to (3) additional 10/100/1000 Base-T, 1000 Base-SX, 1000 Base-LX interfaces	(1) integrated; supports up to (3) additional 10/100/1000 Base-T, 1000 Base-SX, 1000 Base-LX interfaces
SSL Cryptographic Processor	Up to (4); 800 key negotiations/sec	Up to (4); 800 key negotiations/sec
Server Accelerator Sizing		
Maximum Throughput	400 Mbps	400 Mbps
Working set size™	Up to 4 GB	Up to 4 GB
Operating System	CacheOS™ Server Edition	CacheOS™ Server Edition
Features	SSL v2.0 and v3.0, TTL insertion, DoS Protection, Event Logging, Cookie Logging, SSh, Performance Monitoring and Reporting, SNMP, Advanced Routing and Load	

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Protective Order NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA

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File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print Mail News RSS Feeds

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SOLUTIONS | SALES | PARTNERS | SUPPORT | NEWS | ABOUT US

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**CONTENT DELIVERY SOLUTIONS**

**enterprise**

- streaming intranet
- secure intranet
- proxy

**managed service provider**

- bandwidth gain
- hosting solutions


**content provider**

- web server acceleration
- ecommerce acceleration

**Products**

**CacheFlow 700**

- overview**
- features
- specifications
- data sheet (pdf)
- software add-ons



**PRODUCTS**

- client accelerator 600
- client accelerator 6000
- server accelerator 700
- overview**
- features
- specifications
- data sheet (pdf)
- software add-ons
- server accelerator 7000
- ciQ Director
- ciQ Streaming Services
- ciQ Filtering Services

**TECHNOLOGY**

- overview
- ciQ CacheOS™
- ciQ CacheOS Server Ed.™
- white papers
- testing tools
- cdn resources

**ciQ RESOURCES**

- ciQ Ad Campaign [pdf]
- ciQ Brochure [pdf]
- ciQ FAQ
- ciQ Impact Report
- ciQ ppt presentation
- ciQ Press Release
- What is ciQ? [pdf]

The SA-700 series is specifically designed to improve the performance, scalability, security and manageability of high-traffic Web sites. The platform is packaged in a compact 1U form factor, a major advantage in space-constrained data centers. The SA-700 hardware is optimized for Web server acceleration, featuring a high RAM-to-disk ratio and a built-in Secure Sockets Layer (SSL) encryption/decryption processor. This processor can manage 10-40 times more secure sessions than a standard Web server, allowing the SA-700 to accelerate the delivery of both public (HTTP) and private (HTTPS) content.

The SA-700's system software, called ciQ CacheOS™ Server Edition, is expressly tuned for the workload of a high-traffic Web site. This environment is characterized by a finite amount of site content and access by millions of users from around the world - dimensions which are exactly opposite of traditional caching scenarios. Further, the software includes advanced features like an intelligent "Akamaizer", which automatically prepares content for the Akamai FreeFlow<sup>SM</sup> network, and protection against Denial-of-Service attacks, which can crash a Web site.

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Case No. CV-01-2079  
VRW USDC NDCA

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File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print Copy Paste Address <http://www.cacheflow.com/products/700/specs.cfm> Go Links Google



CONTACT US | SITE MAP |

SEARCH

SOLUTIONS | SALES | PARTNERS | SUPPORT | NEWS | ABOUT US

## cIQ Solutions

## CONTENT DELIVERY SOLUTIONS

## enterprise

streaming intranet  
secure intranet  
proxy

## managed service provider

bandwidth gain  
hosting solutions

## content provider

web server acceleration  
ecommerce acceleration

## Products

## CacheFlow 700

overview  
features  
**specifications**  
data sheet (pdf)  
software add-ons



## PRODUCTS

client accelerator 600  
client accelerator 6000  
server accelerator 700  
overview  
features  
**specifications**  
data sheet (pdf)  
software add-ons

server accelerator 7000  
cIQ Director  
cIQ Streaming Services  
cIQ Filtering Services

## TECHNOLOGY

overview  
cIQ CacheOS™  
cIQ CacheOS Server Ed.™  
white papers  
testing tools  
cdn resources

## cIQ RESOURCES

cIQ Ad Campaign [pdf]  
cIQ Brochure [pdf]  
cIQ FAQ  
cIQ Impact Report  
cIQ ppt presentation  
cIQ Press Release  
What is cIQ? [pdf]

**CONFIDENTIAL**-Subject to  
Protective Order NCT v. Novell, et. al  
Case No. CV-01-2079  
VRW USDC NDCA

	Model SA-710	Model SA-725	Model SA-745
System			
Disk Drives	1x20GB IDE	2x18GB Ultra-Wide SCSI	4x18GB Ultra-Wide SCSI
RAM	512MB	1GB	1GB
Network Interfaces	(2) 10/100 Base-T	(2) 10/100 Base-T	(2) 10/100 Base-T
SSL Cryptographic Processor	Integrated; 200 key negotiations/sec	Integrated; 400 key negotiations/sec	Integrated; 400 key negotiations/sec
Server Accelerator Sizing			
Throughput	50 Mbps	100 Mbps	See Below <sup>2</sup>
Working set size <sup>1</sup>	Up to 500 MB	Up to 1 GB	See Below <sup>2</sup>
Operating System	CacheOS™ Server Edition	CacheOS™ Server Edition	CacheOS™ Server Edition
Features	SSL v2.0 and v3.0, TTL insertion, DoS Protection, Event Logging, Cookie Logging, SSH, Performance Monitoring and Reporting, SNMP, Advanced Routing and Load Balancing, Clustering, Automatic Fast Restart, Log File Formats (Common, Squid, Custom), HTTP 1.0 and 1.1, WCCP v1 and v2, Caching		



Active refresh can also be applied to frequently-requested non-cacheable web objects 133, and distributed within the cache system 110, even though those web objects 133 are re-requested from the server devices 120 each time. Active refresh is well suited to web objects 133 such as advertisements, news reports, stock quotes, weather reports, and the like.

The cache system 110 can also maintain information about each web object 133 regarding at which cache 111 in the cache system 110 that web object 133 is recorded. With this information, the root cache 111 can request cached web objects 133 from one of the leaf caches 111, in addition to or instead of re-requesting the web objects 133 from server devices 120.

#### *Method of Operation*

Figure 2 shows a process flow diagram for a method of using a system having multiple caches.

A method 200 is performed by the system 100, including the cache system 110, the client devices 120, and the server devices 130.

At a flow point 210, one of the client devices 120 is ready to request a web object 133.

At a step 211, one of the client devices 120 sends a message to its associated leaf cache 111 requesting a selected web object 133. The request message preferably uses the FTP or HTTP protocol, and includes a URL for the selected web object 133.

At a step 212, the leaf cache 111 determines if the web object 133 is cacheable or non-cacheable. If the web object 133 is cacheable, the method 200 proceeds with the next step. If the web object 133 is non-cacheable, the method 200 proceeds with the flow point 220.

At a step 213, the leaf cache 111 determines if the web object 133 is present in its memory or storage 112. In a preferred embodiment, the leaf cache 111 makes this determination in response to the URL for the selected web object 133 included in the request from the client device 120. If the web object 133 is present, the method 200 proceeds with the next step. If the web object 133 is not present, the method 200 proceeds with the flow point 220.

At a step 214, the leaf cache 111 serves the web object 133 to the client device 120. The method 200 continues with the flow point 210.

10

At a flow point 220, the leaf cache 111 is unable to serve the web object 133 from its memory or storage 112, either because there has been a leaf cache miss or because the web object 133 is non-cacheable.

At a step 221, similar to the step 211, the leaf cache 111 sends a message to the root cache 111 requesting the web object 133.

15

At a step 222, similar to the step 212, the root cache 111 determines if the web object 133 is cacheable or non-cacheable. If the web object 133 is cacheable, the method 200 proceeds with the next step. If the web object 133 is non-cacheable, the method 200 proceeds with the flow point 230.

20

At a step 223, similar to the step 213, the root cache 111 determines if the web object 133 is present in its memory or storage 112. In a preferred embodiment, the root cache 111 makes this determination in response to the URL for the selected web object 133 included in the request from the client device 120. If the web object 133 is present, the method 200 proceeds with the next step. If the web object 133 is not present, the method 200 proceeds with the flow point 230.

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At a step 224, similar to the step 214, the root cache 111 transmits the web object 133 to the leaf cache 111. The method 200 continues with the flow point 210.

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At a flow point 230, the root cache 111 is unable to transmit the web object 133 from its memory or storage 112, either because there has been a root cache miss or because the web object 133 is non-cacheable.

5           At a step 231, similar to the step 211, the root cache 111 sends a message to the indicated server device 130 requesting the web object 133. The request message preferably uses the FTP or HTTP protocol, and includes a URL for the selected web object 133.

10           At a step 232, the server device 130 transmits the web object 133 to the root cache 111

          At a step 233, the root cache 111 determines an object signature 134 for the web object 133.

15           At a step 234, the root cache 111 determines if the web object 133 is present in its memory or storage 112. In a preferred embodiment, the root cache 111 makes this determination in response to the object signature 134. If the web object 133 is present, the method 200 proceeds with the next step. If the web object 133 is not present, the  
20           method 200 proceeds with the flow point 240.

          At a step 235, the root cache 111 determines if the web object 133 is likely present at the requesting leaf cache 111. In a preferred embodiment, the root cache 111 makes this determination in response to the bitmap 114 for the web object 133. If the  
25           web object 133 is likely present at the leaf cache 111, the method 200 proceeds with the next step. If the web object 133 is likely not present at the leaf cache 111, the method proceeds with the flow point 240.

          At a step 236, the root cache 111 transmits the object signature 134 to the  
30           leaf cache 111